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American Engineer

AUGUST 1961

Nuclear Energy and the Engineer

(See Page 19)

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Letters to the Editor

PE's Only . . .

Dear Editor:

The Inter-Society Relations Committee proposal to add a Member grade to NSPE (AMERICAN ENGINEER, June 1961, page 41), defeats the purpose of opening membership to qualified but nonregistered engineers. In the first place it would be a temporary classification because any future members would be registered as prerequisite of Member grade in the National Engineering Societies. Therefore, it would only tend to discourage those members of the Engineering Societies who do not need to and do not intend to register. These are the same engineers we would most want in NSPE, particularly the Fellows of the National Engineering Societies, who, I believe, would be reluctant to join NSPE in any grade short of the highest attainable.

JOHN V. VOLD, P.E.,
Eau Claire, Wis.

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For the Record . . .

Dear Editor:

I appreciate the interesting and informative article entitled "Engineering: Red China's Bridge To The Future," which appeared in your March, 1961, issue.

Feeling the article warranted the attention of my colleagues in the Senate as well, I took the liberty of having it reprinted in the Appendix of the CONGRESSIONAL RECORD.

ALEXANDER WILEY
U. S. Senator
Wisconsin

Broken Up . . .

Dear Editor:

I found it difficult to repress my sobs as I read of the sad plight of today's graduates as described in the June article "What's Wrong With College Recruiting?" What mental torture they must suffer as they are subjected to the pressures from first one, and then another recruiter!

It is fortunate that this problem is receiving some of the attention it so richly deserves.

E. K. HAAS, P.E.
(Cornell '32)
Pittsford, N.Y.

AE Art . . .

Dear Editor:

This is to compliment you on the artwork in the cover of the May, 1961, issue of the AMERICAN ENGINEER. The covers have been especially attractive of late and I'm sure this encourages more people to read this worthwhile publication. I am proud to distribute my copies to my colleagues at work.

JOSEPH F. LUDFORD, E.I.T.
Rome, New York

Dear Editor:

Regarding the June issue of AMERICAN ENGINEER, I would like to inquire if your artist was carried away with his poking fun at the college graduates pictured in their robes and caps. Square heads in the cartoons on pages 14, 21 and 23 are funny. But on the cover . . . Oh my!!!! I'm surprised. Or maybe this is the latest style?

MRS. J. P. ENGLERT
(P. E.'s wife)
Guntersville, Ala.

Definition Needed . . .

Dear Editor:

I am rather surprised to find that a modern dictionary does not even have a listing for *professional engineer*. There is a listing for the abbreviation P.E., but it is defined as a "Presiding Elder" or as a "Protestant Episcopalian." Under *engineer* the definition gives no reference to a profession, nor does it mention any legal significance in the term.

In contrast, the terms *physician, attorney at law, certified public accountant,* and the abbreviation *C.P.A.* are all listed, identified with a profession and the legal significance carefully noted.

In our quest for professional recognition, perhaps we are flying too high. It would seem that a more earthy attitude of first obtaining *any kind* of recognition would be more apropos of the circumstances. It would seem that our basic need is the simple public acknowledgement that our group even exists.

The classified telephone directory, apparently on a national basis, does not even list such a thing as a Professional Engineer, on the logical premise that what does not exist could not be reached by phone.

When such standard references as a dictionary and a common directory do not even identify us, it is rather futile to be concerned over the *quality* of our image. I suggest that our entire activity, energy and finances should be first concentrated on this obvious necessity, to the exclusion of all else. I believe that once we achieve simple public identity for the P.E., we will rapidly increase membership, and can easily handle the other goals.

DON R. KING, P.E.
Milwaukee, Wis.

Peace Corps . . .

Dear Editor:

Thank you for the article in the AMERICAN ENGINEER which sets forth certain suggested principles of operation for the Peace Corps. (April, P. 21) The interest of your Society in this matter is appreciated.

J. W. FULBRIGHT
U. S. Senator from Arkansas
Chairman, Committee on
Foreign Relations
Washington, D.C.

"This Month"

What with satellites and missiles and such, one is prompted sometimes to ask, "What ever happened to the plain old atom?" Well, it is very much around; indeed, quickly moving now from the research era to application. Check our lead piece "This Month" — "Nuclear Engineering: Making the Atom Pay Its Way" — page 19.

Page 25 brings us a further look at the relationship between the engineer and management, the analysis being done by a leading Smith Corona Marchant executive.

Can the engineer square ethics and personal publicity? On that subject let's listen to a man who is vice president of one of the U.S.'s top public relations firms as well as a P.E. Page 29.

This summer finds hundreds of would-be engineering students attending gatherings designed to tell them more about engineering as a career. This timely round-up begins on page 32.

A dip into history on page 34 reminds us of how engineers played a moving role in the "Taming of the Mighty Mississippi." And more on page 37 on work with young engineers at Allis-Chalmers and elsewhere.

Page 41 treats world-wide power expansion. The remainder of the fare "This Month" brings the report of a BER case, page 40; an AE Special Report on free engineering, page 45; and a complete review of the NSPE Annual Meeting held recently at Seattle, page 48.

NSPE's new 1961-62 administration is introduced with a message by President Murray A. Wilson, page 6, and the new committees, page 53.

Now . . . scanning the news "This Month":

General. Page 7. The headlines: Subcommittee takes NSPE view of Science Department . . . Air Pollution Board sees end of smog by 1965 . . . Firm studies conditions for manned moon base . . . Chicago concrete maker sues against product ban . . . Kennedy submits bill to hasten water conversion.

Consulting. Page 9. The stories: The NLRB says surveying is not subject to "hot cargo" provisions of Taft-Hartley . . . Maine engineer loses in A-E court case . . . Senate committee approves $75 per diem . . . GSA issues new A-E form for U.S. agencies . . . Tax court hits Ohio engineer's deductions . . . Montana court warns on approval of educational institutions.

Industry. Page 11. NSPE publishes new book on the engineer in industry . . . Engineering unions in California seek unity . . . Employment agency head says turnover O.K. . . . RCA case goes to arbitration.

Government. Page 13. In the headlines: NSF tallies over 28,000 engineers in state governments . . . Bureau of Public Roads releases data on P.E.'s . . . Professional Government employee group planned.

Education. Page 15. The big stories: House committee votes to extend pertinent portions of 1958 education bill, and ASEE will study research programs on campuses. And in further news, The NSF backs with money a study of technical schools.

Kenneth E. Trombley

Editor

Preview of a Profession's Progress

By Murray A. Wilson, P.E.

NSPE President 1961-62

As the National Society of Professional Engineers starts a new administrative year, the magnitude of the task ahead weighs heavily on your new president, but to counteract this, we think about the opportunities for professional development which are open to all of us if we will but work together for the common goal. If all 55,000 of us will individually and collectively work for the good of the profession, the Society will prosper and the year will be worthwhile.

NSPE has reached one of its important goals. It has a member society in every state and territory of our country, totaling 53, and including the societies of 50 states, the District of Columbia, the Canal Zone, and Puerto Rico. All of us must work together to strengthen each of these societies and to encourage and develop the activities of the local chapters. There are now over 400 local chapters and there are several states which need to promote the establishment of new ones in order to take care of the local needs of their members. It is at the chapter level that new members are obtained, and it is here that the basic philosophy of NSPE ought to be put in practice.

We live in a period of time when change is the most prominent fact of life. The changes, whether for better or for worse, will inevitably result in evolution. In the field of sociology and economics, man has the unique ability of exercising some control over his evolution by guiding the course of the changes that are taking place. To do this he must foresee where alternate courses of action may lead, and by making wise choices he can to some extent direct the course of his evolution. Our Society must be constantly alert to the changes as they affect engineering and engineers and apply our best thinking to the guidance of these changes to the end that the result may be more beneficial than harmful to mankind in general. Engineers have been accused of not looking far enough into the future to evaluate the effects of their new ideas and principles, and we must prove that this is not necessarily the fact by projecting the effect of current developments far enough into the future to be sure that the end product is desirable and beneficial. In other words, we must always seek to do those things which will improve the conditions surrounding the next generation and avoid at all costs those things which might result in penalizing them.

One of the things on which I am sure we can agree is that we should redouble our efforts to bring as many of our fellow professional engineers into our area of activity as we possibly can. In other words, we must adopt a program which will challenge all engineers who have any desire to be professional men, and put forth our best efforts to enlist them in our cause. Our membership of professional engineers now includes approximately 20 per cent of the registered engineers of our country. It has remained at this percentage for the past several years, for the growth in the number of registrants has kept pace with the growth of NSPE so that the total percentage has remained too long in the neighborhood of 20 per cent. I believe that the percentage of registered engineers who are members of NSPE should be a great deal larger than it is now, and so I want you to think about establishing a program looking forward to an even more rapid and sustained growth than we have enjoyed in the past. I believe we should set our aim at a membership which will be equal to 70 per cent of the registered engineers by the year 1970; and we might use as our slogan, "Make it 70 per cent by 70."

We can't solve all the problems this year, but we can start. Let us continue to work toward unity all the way from the National to the local level. Let us continue the search for a clearer description of our objectives and adopt progressive goals for the years ahead. Let's start now to generate enough energy and enthusiasm not only to want, but to believe that we can achieve, a goal of having a membership equal to 70 per cent of the registrants of America by the 1st of July, 1970.—End

Subcommittee Takes NSPE's View of Science Department

The Senate Subcommittee on National Policy Machinery, headed by Senator Henry M. Jackson of Washington, agrees with NSPE on the need for a legislative reorganization of engineering and scientific activities in the White House. The Jackson subcommittee also goes along with the Society's opposition to the formation of a cabinet level department of science and technology.

After studying the impact of science and technology on national policymaking, Jackson's group urged that the present post of Special Assistant to the President for Science and Technology and the President's Science Advisory Committee be made permanent parts of the government—"with statutory underpinning." It was also suggested that an Office of Science and Technology be created within the White House organization to provide staff support for Presidential science advisory groups. Jackson said that the proposed office would be expected to make continuing recommendations to the President for meeting long-term national needs in science and help the President coordinate and evaluate agency programs by serving as technical counsellors to him.

Jackson warned that the new office must adhere to the flexible status of existing science arrangements at the Presidential level. "Science at the Presidential level must never become bureaucratized" he said.

The subcommittee report takes a dim view of a government-wide department of science. At present, eight departments and agencies support major technical programs, and almost all other parts of the government use science in varying degrees to help meet their agency objectives, the study observes. "This diffusion of science and technology throughout the government is not a sign of untidy administrative house-keeping. Rather, it reflects the very nature of science itself. Organizationally, science is not a definable jurisdiction. Like economics, it is a tool. It is an instrument for accomplishing things having nothing to do with science."

The NSPE proposal urging the establishment of a National Advisory Council for engineering and science, to be formed by legislative action, was contained in a recently published report by the Society's Committee on Federal Engineering and Scientific Activities. Copies were widely distributed to governmental and congressional leaders.

The NSPE Committee viewed its proposed National Advisory Council as not only improving Federal interagency cooperation, but also serving as a point of contact between the engineering and scientific community and the Federal Government. With respect to a department of science, the NSPE study group said that in most cases, the engineering and scientific activities of the various Federal agencies are inseparable from their primary areas of responsibility, and that any effort to force such a separation could lead to many completely unworkable organizational situations in the operation of the Federal Government.

Air Pollution Board Sees End of Smog by 1965

Los Angeles County could be as free of smog by 1965 as it was in 1940, concluded the Air Pollution Control District recently in a 290-page report submitted to the Board of Supervisors by Air Pollution Control.

Second of a series of Technical Progress Reports being published by the District, the volume "Air Quality of Los Angeles County," sums up ten years of air measurement and analysis by the APCD.

The prediction that smog may be reduced to its pre-war level by 1965 is based upon these facts, the report states: Many contaminants from nonmoving sources already have been reduced below the 1940 level; the other contaminants of significance from nonmoving sources should be reduced to that point by developments already under way or planned for the next few years; and effective air pollution controls for motor vehicles are scheduled to be on most vehicles by 1965.

After 1965 a continuing effort will be needed to restrain pollution as industry, population, and motor

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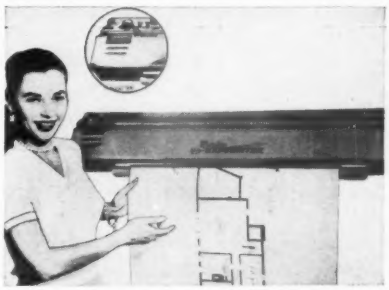

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vehicles continue to increase and expand into areas now undeveloped, according to the report.

During the past twenty years, population and motor vehicles have more than doubled, gasoline consumption has more than tripled, and other factors affecting air pollution have increased comparatively. Similar increases after 1965 could cancel out the gains made in controlling smog unless control techniques can be improved further.

Smog effects during the past ten years were at their worst during late 1955 and through 1956, is shown in the report by summaries of measurements of air contaminants and their effects. A reduction in smog effects is noted during 1957-58.

Firm Studies Conditions for Manned Moon Base

A study to investigate various methods of manned tranportation between the earth and the moon, beyond the Project Apollo has been assigned to The Martin Company by the National Aeronautics and Space Administration (NASA).

The Earth-Lunar Transport project is under the supervision of NASA at the Marshall Space Flight Center in Huntsville, Alabama. According to E. E. Clark, director of advanced design at Martin's Baltimore division, the new earth-lunar study covers the transportation system required for these three basic missions: A lunar landing and immediate return to earth for three men; a 30-day stay on the moon for three men; and a permanent moon base which would accommodate ten to twelve men.

The $75,000 initial study contract covers a wide variety of problems, including those of boosting the vehicles into space, soft-landing them on the moon and returning them to earth again. The study also will consider vital provisions for man's extended existence in the space and lunar environments.

On the moon itself, for example, there must be shelter against violent temperature changes. Each lunar day or night is as long as 14 earth days. During such periods, and due to the absence of measurable atmosphere, temperatures rise as high as 244 degrees Fahrenheit. During the long night they drop as low as 213 degrees below zero.

Chicago Concrete Maker Sues Against Product Ban

Crest Concrete Systems, a manufacturer of prestressed concrete products in the Chicago area has filed a suit in the Circuit Court of Cook County, against the City of Chicago and Building Commissioner George L. Ramsey. Crest claims that Ramsey has arbitrarily refused to accept their prestressed concrete products for Chicago buildings even though their products meet all of the requirements of the Chicago Building Code. Crest also charges that Ramsey has issued repeated warnings to architects and engineers against the use of prestressed concrete and Crest has asked the Court to enjoin and restrain him from doing this further.

In the case against Ramsey, Crest cites nine buildings constructed with prestressed concrete prior to his ban on the use of the material. Included in the list was Chicago's new $32 million McCormick Place Exposition Center. Ramsey denies that he approved prestressed concrete for eight of the buildings and said that McCormick Place was not under his jurisdiction.

Recently a committee of the Illinois Section of the American Society of Civil Engineers was established to study the commissioner's position on prestressed concrete. The committee was composed of seven registered structural engineers and they reported: "The temporary restrictions on prestressed concrete by the Building Department are, in the opinion of the Committee: (1) Directed at one material without relation to the performance requirements for other materials; and (2) inconsistent with the Code for new materials."

Kennedy Submits Bill to Hasten Water Conversion

President Kennedy has submitted draft legislation to Congress which would expand and accelerate Federal effort to convert saline water into fresh water. It would increase the time limit on Federal programs for saline water conversion, remove the financial ceiling on research and development activities and provide Federal aid to local communities in constructing conversion plants.

"I know of no Federal activity that offers greater promise of making a major contribution to the ultimate economic well being of all mankind than this program," the President said in a letter accompanying the legislation.

Interior Secretary Stewart L. Udall, whose department drafted the legislation, said that while construction of demonstration plants authorized by the saline water act of 1958 is already underway, "further research is expected not only to improve those processes but it also holds promise of developing entirely new methods which may permit the attainment of a major breakthrough."

Udall said it is necessary to remove the expenditure ceiling and extend the time limit of the 1958 act "because it is impossible to predict in advance the rate of progress that might be achieved, or to predict the cost of solving a technological problem of this magnitude."

The basic changes proposed by the Kennedy legislation would extend the program from 1963 to 1971, remove the expenditure ceiling and extend the demonstration project program, without any appropriation limit, so that an unspecified number of additional demonstration plants can be constructed. The bill would also authorize Federal financial assistance for the construction of actual conversion plants as an incentive for communities to take the initiative in conversion.

President Kennedy views his bill as providing the Interior Department with a wide variety of tools to attack the saline water conversion cost barrier. "It contemplates a major acceleration of current programs of basic and applied research," he added, "and permits the construction of conversion plants far larger than any now in existence."

NLRB Says Surveying Is Not Subject to 'Hot Cargo' Clause

The NLRB has ruled that land surveying is properly classed within the construction industry, and is not subject to the "hot cargo" provision of the Taft-Hartley Act.

The ruling, issued in the settlement of a dispute between two California unions of survey crewmen, makes it legal for a union to force a contractor into an agreement not to do business with survey firms paying less than union scale wages.

Under the Taft-Hartley Act, it is illegal for an employer to sign an agreement with a union not to do business with another employer. However, the law states that this provision does not apply to the construction industry.

The General Counsel argued that land surveying should not be considered part of the construction industry because it is not performed in connection with above ground structures. The Trial Examiner said that such an interpretation would exclude from the construction industry such projects as the Federal-Aid Highway Program, pipelines and tunnels.

The two unions involved in the dispute were the International Union of Operating Engineers, AFL-CIO, and the Tri-Counties Association of Civil Engineering Employees. The Vandenberg Development Corporation had agreed with the Operating Engineers not to subcontract with firms paying less than union wages. Vandenberg retained a land surveying firm whose employees belonged to the Tri-Counties union, and who were paid less than the Operating Engineers' pay rates. After threatened court action by the Operating Engineers, Vandenberg stopped doing business with the surveying firm, and the Tri-County union charged the Operating Engineers with a violation of the Taft-Hartley "hot cargo" provision.

After finding that this provision does not apply to surveying, however, the NLRB Trial Examiner recommended dismissal of the complaint.

Maine Court Upholds Decision Against Engineer

The Maine Supreme Court has upheld a lower court decision that a registered professional engineer may not advertise himself as an "Engineer & Architect" unless he is also a registered architect.

In appealing his lower court conviction, the engineer claimed that the wording of the architectural law, which allows an engineer to practice architecture "incidental" to his engineering, made his "Engineer & Architect" title legal. He also said the architectural law represents an unconstitutional use of the State's police power, which is limited to matters affecting the public health, safety and welfare. Since the only difference between engineering and architecture is a matter of aesthetics, reasoned the engineer, and since aesthetics have no effect upon public health, safety and welfare, no state law can constitutionally prevent him from practicing architecture.

The Court said, however, that architecture can make the difference between ". . . employment and unemployment, thriving commerce and a low standard of existence," and thus has a very direct affect upon the public welfare.

The registration laws of the two professions are parallel, said the Court, except that the architects' law contains an additional provision requiring the ability to coordinate ". . . structural factors concerning the aesthetic." Since the two laws overlap in all respects except this one, the court concluded that "while all architects may be engineers, all engineers are not architects."

In addition, ruled the Court, the title "Engineer & Architect" implies that the practitioner is legally qualified in both professions, and that his architectural work is not limited to that "incidental" to engineering. (*State of Maine v. Melvin W. Beck*)

$75 Per Diem Set for Consultants by Committee

After much deliberation the per diem authorization for consultants in the Department of Commerce appropriations bill has emerged from the Senate Appropriations Committee at the $75 level.

In line with repeated NSPE recommendations, the Administration's budget to Congress carried a recommended maximum of $100 per diem. The House Appropriations Committee, noting that the previous authorization had been $50, recommended allowing payments at the highest daily rate on

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the GS scale, or $60.88. Then, although the full Senate had recently passed a bill to raise the Commerce Department's limit to $100, the Senate Appropriations Committee recommended $75.

If the Senate votes for the $75 limitation, the conflicting versions will go to conference for resolution.

GSA Issues Government A-E Form for Agency Use

The General Services Administration has issued a new eight-page U.S. Government Architect-Engineer Questionnaire to be used by all U.S. agencies.

Designated as Standard Form 251, the new questionnaire solicits information about consultants' key personnel, outside associates, personal history of principals, and present and completed engineering activities. Regulations issued with the form state that it must be used whenever agencies seek engineering or architectural services for construction, alteration, or repair of buildings, bridges, roads, or other kinds of *real* property. Its use is not required when seeking A-E services for construction, alteration, repair, processing or assembling of vessels, aircraft, or other kinds of *personal* property.

Tax Laws Leave Engineer With No Legal Deductions

The U.S. Tax Court has held that a consultant is not entitled to a travel-expense deduction for food and lodging in a city where he spent most of his time, even though he maintained a home and an office in another city.

An industrial consulting engineer, all of whose clients were located in Dayton, Ohio, claimed as travel expense deductions from income all the money he spent for food and lodging in Dayton, which is 37 miles distant from his home in Greenville. The Tax Court ruled that because he spent only 52 nights out of the year in Greenville, and because the great bulk of his actual work was performed in Dayton, he could not claim Greenville as his home for tax purposes, and could not deduct his Dayton food and lodging as business travel expense.

Pennsylvania Consultants Form Functional Section

Consultants of the Pennsylvania Society have recently formed a functional section to bring to 27 the number of active state functional sections for consulting engineers.

Thirty consultants met during the 1961 Pennsylvania Society Convention and voted without dissent to form the functional section. Elected as interim officers, to act as an executive committee until the next convention, were Hugh M. Nelson, chairman; M. E. Frye, vice chairman; and Louis W. Moxey, III, secretary. The Executive Committee will prepare bylaws and a program of activities for submission to the Pennsylvania Society Executive Board and the functional section members.

Montana Case Serves to Warn Registration Boards

A recent decision of the Montana Supreme Court, involving the State's Board of Chiropractic Examiners, provides a word of warning to all professional licensing boards with respect to the approval of educational institutions.

In this case, the Court ruled that the Board was guilty of a "manifest abuse of discretion" in following the chiropractic school accreditation list of the National Chiropractic Association. As a result, the Board was ordered to give an examination to two graduates of the Palmer School of Chiropractic, a school which is not approved by the N.C.A.

Montana law gives the Board authority to require that applicants for a license "shall be a graduate of a college of chiropractic approved by said Board." Under this authority, the Board decided to approve all schools accredited by the N.C.A., saying it was impossible for it to visit and inspect all schools in the United States. This resulted in the Palmer School not being approved because it is not accredited by the N.C.A., due primarily to the fact that Palmer, contrary to an N.C.A. regulation, is not organized as a nonprofit corporation.

The Court's opinion said that the Board's reliance on N.C.A. accreditation was "such a manifest abuse of discretion as to amount to a failure to act at all." The Court implied that some consideration might be given to "recommendations of an association of practitioners which fairly represent the profession and which strive to promote the highest standards of professional educational preparation." However, the Court emphasized that in this case the Board had nothing before it except the nonapproval of the N.C.A., and also that the Board had refused to make its own investigation. Under these circumstances, the Court concluded, the plaintiffs had a right to take the examination, because the Board had failed to take valid action.

Although the Court did not mention it, it is interesting to note that the Model Engineering Registration Law provides for graduation "of an engineering curriculum of four years or more approved by the Board as being of satisfactory standing." Generally, engineering registration boards rely to some degree at least on the ECPD list of accredited engineering curricula. Similarly, many state bar examiners rely on the law-school accreditation procedures of the American Bar Association in admitting persons to bar examinations. (*Westercamp v. Montana State Board of Chiropractic Examiners*, 352 P.2d 995, 1960.)

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New Book Shows Progress Made by Engineer in Industry

The engineer in industry has made consistent professional gains in the past decade, but much still remains to be done before true professionalism is accepted as the industrial standard.

This is the conclusion of *The Engineer in Industry in the 1960's —A Professional Program*, a new book by the NSPE Engineer-in-Industry Committee. Announced at the NSPE Seattle Annual Meeting, the new publication gives a long look at the engineer in industry, his goals, his problems, and what can be done to help his search for professionalism.

The goals of the engineer today are much the same as they were ten years ago. He still wants to be considered part of the management team, to use his professional training to the fullest, to gain proper professional recognition, and to be paid a salary equal to his contribution.

Recent studies show gains in many areas, but indicate further room for improvement. The engineer now retains his starting salary advantage over graduating classmates in the fields of accounting, sales and general business. He formerly fell behind them within ten years of graduation. The compression, or "telescoping" of engineering salary ranges, appears to have ended. Since 1956, salaries of experienced engineers have increased at a slightly greater rate than starting salaries.

A comprehensive study of the history of engineering unions shows that engineers are less and less inclined to turn to unionism to achieve their aims. The failure of several unions has been laid to the basic conflict between unionism and professionalism. "You can't ride two horses," admitted one union man.

The number of moves to affiliate nonbargaining groups of employed engineers with NSPE chapters has increased. Such affiliations offer advantages to both the "sounding board" groups and NSPE through mutual support.

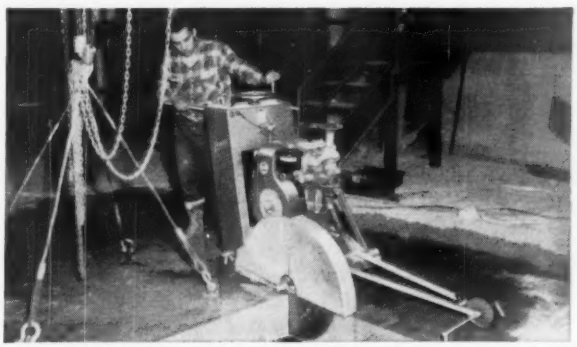
As suggested by its title, the new publication devotes major attention to methods for further improving the professional status of the engineer in industry. Noting the joint responsibility of management, the individual engineer, and professional societies, a detailed proposal for action is set forth. Much needed further progress, concludes the study, can only come through mutual cooperation and continued effort.

Engineering Unions Seek to Unite in California

With the failure of the Nationwide Engineers and Scientists of America last winter, three independent California engineering unions are now seeking to band together on a more modest scale.

Speaking before the 67th annual convention of the Engineers and Architects Association, President Max Mayfield of the Southern California Professional Engineers Association suggested that the two independents join together, along with the Engineers and Scientists Guild, to form a state-wide confederation of independent engineering unions.

(Continued on next page)



TRUCO® DOES IT AGAIN!

Makes history by sawing 11½" thick, 5000 lb. test concrete reinforced with 2 layers of ½" rods on 8" centers. Big slab sawed out in 3½ hrs.

PROJECT: Wind tunnel at government research base. **CONTRACTOR:** Nash Drilling Co., Ltd., Montreal, P.Q. **EQUIPMENT:** Truco 18 H.P. Economy Concrete Saw; Truco Tru-Bond Diamond Blade 26" dia. $\frac{3}{16}$" thick. **JOB:** Cut an inspection opening 10'0" x 5'0" in 5000 lb. test concrete reinforced with 2 layers of reinforcing rods ½" dia., placed on 8" centers. Slab was marked off in two 5'x5' sections, and 3" holes drilled in the four corners of each section to receive fastenings for cables to support slabs. Four cuts released the first slab for removal. Three more cuts released the second slab. The 26" dia. Truco Diamond Saw made a 10½" cut and the remaining concrete on the wavy underside (about 1") easily broke away when the slab was lifted. Actual cutting time was only 3½ hours and the entire job was easily done in one day. Savings are so great Truco Diamond Drilling and Sawing Equipment may pay for itself on a single job or in a single day. Send for new Truco catalog.

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Allowing two years to work out differences and details, Mayfield proposed the following as features of the new "California Association of Professional Engineers":

- A strong central leadership.
- Separate councils for aerospace engineers, governmental engineers, utility engineers, consulting engineers, and an over-all coordinating council.
- Dues to be collected by the parent organization, with return proration to be determined by a "responsive and responsible convention."

With all three independents accepting nonprofessional as well as professional employees, the combined membership of the proposed new organization would be slightly less than 20,000. At present, the three independents have units at Douglas Aircraft, General Dynamics, Lockheed, Los Angeles City and County governments, Rheem Manufacturing Company, and Southern California Gas Company.

In other union developments, process control chemists at Goodyear Tire & Rubber Company's Houston, Texas, plant have voted to decertify Local 347 of the International Union of Operating Engineers, AFL-CIO, by a margin of eight to six.

Because they had originally voted to certify the union as a separate unit, the chemists were given a separate decertification vote, even though the union had lumped them in with production employees for contract bargaining.

Chemists, engineers and technicians at the Tidewater Oil Company in California, have voted in favor of representation by the Oil, Chemical & Atomic Workers, AFL-CIO, by a count of 42 to 33.

Employment Agency Head Says Turnover Is Vital

What the defense industry needs is more, not less, mobility among its engineering and scientific personnel, says the president of a national professional employment agency.

Disputing statements that recruiting has no place at professional meetings, William Douglass, president of Careers Incorporated, has told a group of industrial relations experts in Los Angeles that necessary shifts in defense programs call for corresponding shifts in engineering and scientific personnel.

"Job mobility is a necessary and built-in part of our defense structure," said Douglass. "It is up to our own industrial community to devise its own ways whereby these necessary transfers can be affected."

Douglass said that his firm's "Career Centers," usually operated in conjunction with professional society meetings, make professional recruiting more efficient, and allow job-seeking in a dignified and professional atmosphere.

Re-educating Engineers Seen as a Major Need

A recent Manpower Utilization Conference has concluded that the re-education of engineers and scientists has become a major industry need, and has proposed a study to determine the tangible benefits of such a program.

The Conference was held at Los Angeles recently under the sponsorship of UCLA and the American Society for Engineering Education.

Professor J. Morley English of UCLA has reported that the conference was attended by nearly 100 representatives of industry and local universities. Several speakers pointed out that the changing technology leaves engineers, scientists and their companies behind unless continued re-education takes place. It was noted that the education of engineering and scientific personnel has a direct bearing on an industry's vitality.

A resolution was passed calling for the Relations With Industry Groups of the ASEE Pacific Southwest Section to study and identify the actual benefits of a re-education program to industry.

Court Orders RCA Case Settled by Arbitration

Reversing a lower court decision, the New Jersey Third Court of Appeals has ruled that a disagreement over the Radio Corporation of America's application of merit raise provisions in the union contract must be submitted to arbitration.

The Association of Scientific and Professional Engineering Personnel had charged that RCA was not awarding merit raises in accordance with contract provisions. When the union submitted the matter to arbitration, RCA filed suit to have the union's grievance declared nonarbitrable. The lower court ruled in favor of the company, and the union appealed.

Under provisions of the RCA-ASPEP contract, all disputes must be submitted to arbitration, except that arbitrators "shall have no authority . . . to change an existing wage rate, or to establish a new wage rate." The company argued that a merit raise amounts to a change in existing wage rates, and is therefore not subject to arbitration.

In ruling against them, however, the appeals court said that merit raises are closely fixed by the terms of the contract. Therefore, if an arbitrator finds the company is not properly giving merit raises, and directs them to change their practices, it would merely be an enforcement of the contract rather than an actual change in existing wage rates.

The court declined to rule on whether RCA had actually misapplied the merit raise provision, leaving this to the arbitrator.

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NSF Tallies Over 28,000 Engineers in State Agencies

A full scale study of engineering and scientific manpower employed by state governments reveals that as of January, 1959, there were 28,172 engineers employed by various agencies, with the greatest concentration occurring in highway and public works departments.

The study, "Employment of Scientific and Technical Personnel in State Government Agencies," showed a total of 12,558 scientists and 46,798 technicians, most of whom act as assistants to engineers or scientists. The pioneer study was conducted for the National Science Foundation by the Bureau of Labor Statistics of the U.S. Department of Labor. The survey covered all state governments and all agencies or those states except those primarily concerned with judicial, legislative and educational functions. Approximately 97 per cent of the 3300 state agencies contacted returned usable data.

Of the 28,172 engineers employed by the states, 59 per cent hold a bachelor's degree or higher. Forty-five per cent are registered as professional engineers. By far the largest number—26,000 are civil engineers. The report showed 601 mechanical engineers; 542 electrical and 947 in such categories as safety, industrial, valuation, chemical, petroleum and mining. Nearly 93 per cent of the 26,000 civil engineers are employed in highway and public works departments, with about four per cent in health and welfare departments.

Among all types of engineers in all agencies, more than half (56.5 per cent) are engaged in operations and services, while planning and inspection each accounted for about one-fifth. Only a little over one per cent of the engineers in all agencies were engaged in research. The report observes that this contrasts sharply with engineers employed by industrial concerns, where more than one-third are engaged in research and development or the administration of such work.

The report notes that with only 59 per cent of the engineers holding a bachelor's degree or higher, "many state-employed engineers evidently qualified for their positions through experience, without completing their formal education." The report adds that this is a considerably lower proportion of college graduates than occurs among engineers employed in private industry—78 per cent in 1959. Among the engineers surveyed, 56 per cent of those employed in highway and public works departments have college degrees, but in health and welfare agencies, more than 88 per cent are college graduates.

Physical scientists comprised only about five per cent of all state-employed engineers and scientists in the survey, whereas in private industry, physical scientists account for 15 per cent of all engineering and scientific employment. More than half of all physical scientists employed by state government agencies are chemists. Of these, the largest proportion (41 per cent) work in health and welfare departments, with more than 32 per cent in agriculture and related agencies. Four states—New York, California, Florida and Massachusetts — accounted for 35 per cent of all chemists employed by the 50 state governments.

The report showed that the number of state-employed technicians exceeds the number of engineers and scientists by a ratio of 115 technicians to 100 engineers and scientists. This contrasts with a ratio of 72 technicians to 100 engineers and scientists in industry. Of the state-employed technicians, more than 50 per cent, or about 24,000 are engineers or physical science aides. In addition, there are approximately 9300 surveyors, 7100 draftsmen and 6200 technicians in the life sciences.

The numerous technicians in highway departments generally work under the supervision of civil engineers, the report said. Their activities include surveying and assisting in other preliminary engineering work for new roads, drafting plans for roads designed by engineers, inspecting construction work performed by contractors and aiding in road maintenance.

Employment of engineers and scientists in the 50 states ranged from 71 in Alaska to 5310 in California, although the report discounts a direct relationship between the employment of engineering and scientific personnel and population. In general the report declares that among the factors affecting engineering and scientific employment are: Population, available funds, natural resources, types of industries, prevailing philosophy of government with respect to the types and extent of services provided and the division of responsibility between state and local governments.

Bureau of Public Roads Releases Data on PE's

A 1960 inventory report of state highway engineering employment shows that in January, 1960, state highway departments, including the District of Columbia, employed 23,508 engineers and 44,216 engineering aides (technicians) for a total of 67,724 engineering employees, an increase of 13.8 per cent in engineers and 69.7 per cent in the aide category since March, 1956.

In addition the report declares that private consulting firm personnel supplied the equivalent of another 3800 engineers and 3600 technicians, so that the total engineering effort expended by state highway departments could include approximately an additional 7400 engineering employees.

The report was prepared by James M. Montgomery and Elmer H. Rehberger of the U.S. Bureau of Public Roads for presentation before an early 1961 meeting of the Highway Research Board, but was only released to the public recently under the title, "Trends in Highway Engineering Employment."

The 1960 report, which is a follow up to a similar study conducted in 1956, stated that capital outlay by state highway departments rose from over $2200 million in 1955 to more than $4800 million in 1959, an increase of almost 120 per cent. The increase in dollar expenditures was accompanied by only a 52.7 per cent increase in total engineering man-years, including the work of consultants. "In all probability," the report notes, "the use of electrical accounting data processing machines, aerial surveying techniques, simplified procedures, and the like contributed to increased efficiency; but it is likely that much additional productive effort was gained by the more effective utilization of engineering manpower."

The Montgomery-Rehberger study reported that the ratio of technicians to engineers in the state highway departments is rising. In 1960 engineers were supervising 1.88 aides or technicians as compared to 1.26 in 1956. However, the figures show a wide variation among the states. In general, as was true in 1956, the study shows that the more highly populated regions tend to employ a greater percentage of engineers in relation to aides than do less populated regions, although there are some exceptions.

Civil engineering graduates and/or registered professional engineers represented 61.2 per cent of the total engineers counted in the 1960 report, which compares favorably to the 1956 figure of 55.6 per cent.

Professional Government Employee Group Planned

Plans are being made by a group of individual Federal employees to form an organization of professional employees, composed of engineers, scientists and other professionals, as well as those in executive and managerial positions.

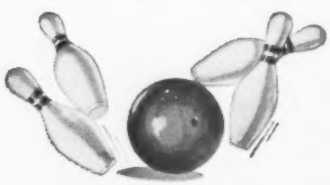
Details for the new group are still at the preliminary stage, and its sponsors would like to obtain an expression of employee interest and opinions of the proposed association before further work is done toward its organization.

Backers of the association believe that existing employee organizations are inadequate for developing and communicating the opinions and attitudes of professional employees. These organizations, they say, "are heavily dominated by nonprofessional interests, and flavored by many aspects of unionism which are repugnant to professional people, and do not count among their members any significant fraction of the professional government population."

Sponsors of the professional association have clearly pointed out that the new organization should not be confused with the concept of the usual professional society which is composed of members of a single profession with the primary purpose of improving the expression or communication of a particular subject matter. "The many diverse societies for engineering, for example, do not take the place of the National Society of Professional Engineers which exists not to advance a given engineering subject, but to further those aspects of the engineering profession common to all."

Broad objectives of the association would be to: Enhance the value of the Federal service to the public; maintain high professional standards; and promote the welfare of professional personnel in government. Although the new association plans to engage in a variety of activities common to similar groups, a key function would be the formulation of opinions on pending legislation and the presentation of those opinions with the necessary supporting data to appropriate authorities.

Tentative plans call for any employee of the Federal Government in grade GS-5 or above who is in engineering, scientific, technical or administrative work to be eligible for membership. Sponsors note that this criterion is consistent with Federal civil service law which provides that the attainment of a professional college degree at the baccalaureate level qualifies an individual for appointment to a GS-5 position, which would result in a predominantly professional membership. Membership would be open to both part time and retired employees.



You spent $450,000,000 on bowling last year

13½ times as much as you gave to fight cancer

Shocking? Yes. And here's another shocking fact: over the years, cancer strikes in approximately two out of three American homes.

Go bowling. It's fun. Enjoy yourself. But when you spend fifty cents to knock down pins—give as much to the American Cancer Society—*to knock out cancer.*

If you do that, you will be giving $450,000,000 to fight cancer this year. *Thirteen and a half times as much as last year!* Fight cancer with a checkup—and a check to the **American Cancer Society.**

Committee Approves Bill to Expand 1958 Education Act

The House Education and Labor Committee has approved a clean bill embodying various amendments to the 1958 National Defense Education Act. The bill extends a number of the Act's provisions that are due to expire next year.

The undergraduate student loan program has been extended in the bill to 1966 and has been considerably expanded in terms of available loan funds. The forgiveness feature (up to 50 per cent of the loan) has been extended to borrowers who become teachers in colleges or universities as well as to those who become teachers in elementary and secondary institutions.

The Committee proposal also extends the fellowship program of the NDEA from 1962 to 1966, and increases the aggregate number of new fellowships to be awarded annually from 1500 to 5000. Each fellowship would provide up to three years of academic study. The Committee bill eliminates the fixed stipends allowable for each fellow and provides instead that persons awarded fellowships "shall receive stipends (including allowances for dependents) in such amounts as may be prescribed by the Commissioner (of Education)." In addition to the stipends, the bill fixes the "cost-of-education" allowance to the institution attended by a fellowship holder at $2500 annually per fellow in new or expanded graduate programs and $2000 in other programs, in place of the varying amounts now authorized.

The Committee's clean bill extends for three years to 1965 the $15 million per year Federal vocational education program "which is designed to fit individuals for useful employment as technicians or skilled workers in recognized occupations requiring scientific or technical knowledge." The vocational education program embraces less-than-college-grade courses conducted under public supervision and control (H.R. 7904).

ASEE Studies Research on Engineering Campuses

Over 11,000 research projects are in progress in 121 leading engineering colleges throughout the United States, according to the biennial review just published by the Engineering College Research Council of the American Society for Engineering Education.

During the current year over $180 million have been expended on research projects, according to figures just released. Professor Ross J. Martin, director of the University of Illinois Engineering Experiment Station and chairman of the Engineering College Research Council, said that research expenditures are the highest ever recorded in the seventeen years of ECRC surveys.

"The increasing quantity and quality of basic research in engineering colleges is an excellent indication of the strength, vigor, and progress of the engineering profession in the United States," Professor Martin stated. "At a time when basic research is necessary to provide technological superiority in the world, engineering college research is serving the needs of the Nation," continued Professor Martin.

"In addition to bringing forth new knowledge, engineering college research serves another important purpose; it provides for the advanced education of students who, upon graduation, contribute creatively to the increasingly complex technology of the future," Professor Martin concluded.

The 1961 survey of engineering college research gives complete titles for all projects under way in schools which hold ECRC membership; the number of persons engaged in research at each institution is listed, and research policies are summarized.

The 1961 *Engineering College Research Review* has been edited by Paul T. Bryant, editor of the *Journal of Engineering Education* of the American Society for Engineering Education, and John F. Penn of the University of Illinois Department of Electrical Engineering, and may be obtained from ASEE.

Meetings of Note

American Astronautical Society—Annual West Coast Meeting — August, Palo Alto, California.

Society of Automotive Engineers—National West Coast Meeting—August 14-17, Sheraton Hotel, Portland, Oregon.

American Rocket Society—Biennial Gas Dynamics Symposium—August 23-25, Northwestern University, Evanston, Illinois.

National Council of State Boards of Engineering Examiners—Annual Meeting—August 23-26, University of Kentucky, Lexington, Kentucky.

American Society of Mechanical Engineers — International Conference on Heat Transfer—August 28-September 1, Boulder, Colorado.

American Chemical Society—National Meeting — September 3-8, Chicago, Illinois.

Engineering Management Conference—Sponsored by American Institute of Electrical Engineers and the American Society of Mechanical Engineers—September 14-15, Hotel Roosevelt, New York, New York.

Association of Iron and Steel Engineers — National Convention — September 25-28, Penn-Sheraton Hotel, Pittsburgh, Pennsylvania.

Professor Sees Need for Revision in Curriculum

A "re-evaluation of the goals" of undergraduate electrical engineering education, to prevent 90 per cent of the students from entering a "never-never land" of theory with the danger of becoming "mathematical robots," was urged at the recent summer general meeting of the American Institute of Electrical Engineers at Cornell University by Simpson Linke, associate professor of electrical engineering at Cornell.

"The present emphasis on science

and mathematics in electrical engineering curricula is creating a research-oriented type of undergraduate education that may lead to inadequate preparation for professional careers in engineering," he said. "Since 80 to 90 per cent of our undergraduates intend to follow professional, rather than research or teaching careers, there can be no doubt about the necessity for increasing emphasis on basic subjects in this age of rapidly expanding technology." It is equally important, he added, that college courses concentrate on "broad functions that are applicable to all branches of electrical engineering," with less attention to special devices, design, shopwork, and so-called technical drudgery. As a result of this attitude in engineering courses, the student is placed in a never-never land where everything works exactly as the theory says it should.

"When these conditions are coupled with the philosophy, prevailing in some quarters, that an engineer is now only required to visualize and expound the problem and that the actual final solution is trivial, it is possible for many nonresearch minded graduates of our schools of electrical engineering to become mathematical robots completely out of touch with the physical realities of engineering problems. Such men will be neither scientists nor engineers. They know that they are inherently without scientific creativity and their education has convinced them that engineering creativity is somehow beneath them."

The problem is further complicated by "spoon-fed" students who have been permitted to "pick and choose" high school subjects and to "avoid unpleasant, routine and distasteful tasks. This lack of motivation for achieving technical excellence has led many of them to decide to become sales engineers, application engineers, engineering managers, engineering administrators—anything but professional engineers."

Professor Linke advocated attaching a "sturdy laboratory stem" to the present "core curriculum," to "parallel and complement the theoretical work," throughout the undergraduate program.

Survey Shows Engineering Graduates Still in Demand

Although there has been much concern over the tightening market for this year's crop of graduating engineers, a survey conducted by the Engineering Manpower Commission shows no slackening in the rate at which they are being committed to definite plans following graduation.

A comparison of 49 schools shows 83.8 per cent definitely committed (with jobs, entering military service, entering graduate studies or with other definite plans) as of May 19, 1961. The comparable percentage for 1960 was 84.4 per cent. Although there was a three per cent drop among those with jobs, this was compensated by a 2.5 per cent increase in the number going into graduate study, and at nine per cent increase in the number going into military service.

It should be noted that final tabulation of all participants may affect the results. Furthermore, these data include only those for whom the placement offices had information. Results based on a later survey will give a more complete picture.

Study of 2-yr. Technical Schools Backed by NSF

A grant of $47,250 from the National Science Foundation (NSF) will make possible the Nation's first critical evaluation of two-year technical training programs in American technical institutes.

The grant to the American Society for Engineering Education was announced recently by Dr. Eric A. Walker, president of ASEE, addressing the opening general session of the society's 1961 annual meeting at the University of Kentucky. Dr. Walker is president of the Pennsylvania State University.

The study will be made, he said, at the request of Engineers' Council for Professional Development. Its objective, according to Dr. Walker, is a "profession-wide effort to improve technical education in technical institutes by conducting a study of the present role of technical education and its relation to engineering education, as a basis for developing educational and accrediting standards."

Dr. Harry C. Kelley, associate director for educational and international activities of NSF, said, "The results of this study should provide a significant contribution to the improvement of technical education."

The ASEE's program for an evaluation of technical institute education was prepared by a committee under Dr. Cecil C. Tyrrell, president of Broome Technical Community College in Binghamton, New York. Commenting on it, Dr. Tyrrell said, "The critical shortage of technological manpower in the United States is a matter of National concern, and the undersupply of engineering technicians is just as acute and just as severe as the undersupply of engineers and scientists.

"The engineering technician and the technical institutes' educational programs in higher education designed to prepare the technician for his work have wide National significance. An evaluation such as we propose will make a direct contribution to the National welfare by providing a sound base for strengthening and coordinating technological education and, eventually, for establishing better criteria for evaluating and accrediting individual programs."

Stevens' Graduates Hailed for Nonspecialization

Stevens Institute of Technology was recently lauded "one of only a few schools in the Nation which emphasizes a program of nonspecialized training in engineering and science," according to Atomic Energy Commissioner Leland J. Haworth speaking to a group of Stevens' graduates.

He added, "This nonspecialized training permits the graduates to go forth with a broad fundamental knowledge that is extremely useful as a base for teaching, for later specialization, or for administration of technical work."

Haworth continued to say that the nonspecialized engineering graduate is becoming more and more valuable in the face of the increasing number of fields in which engineering plays a role.

Strictly Business

Personalities . . . **PCA Electronics, Inc.** has announced the appointment of **King H. Dendy** to the position of vice president in the capacity of technical adviser to the president . . . **Dr. Robert A. Nottenburg** has been named vice president-education and training at **Cleveland Institute of Electronics** . . . **Parsons, Brinckerhoff, Quade & Douglas** has announced that **John O. Bickel** has retired as a general partner and **John E. Everson** has been elected to partnership . . . **W. C. McKenzie, Jr.,** has been appointed by the governor of Alabama to the State Board of Registration for Professional Engineers and Land Surveyors . . . **William Z. Harper** has been appointed an assistant superintendent of the utilities division at the Kodak Park Works of **Eastman Kodak Company** . . . **Robert C. Baldwin** has been appointed assistant editor of the *Journal,* technical publication of the **American Concrete Institute** . . . **Keasbey & Mattison Company** has appointed **John C. Langford** personnel manager and purchasing agent for their new plant in Hillsboro, Texas . . . **Robert W. Lear** has accepted a position as vice president in charge of marketing for **The Carborundum Company.**

Mr. Dendy

Rodney D. Chipp has resigned at International Telephone & Telegraph Corporation to open his own office of consultants in Bloomfield, N. J. . . . **Adler Electronics, Inc.,** has appointed **Michael T. Trainor** as executive engineer, Military Products Division . . . **The Trane Company** has recently opened a new sales office in Poughkeepsie, N. Y. . . . **Edward E. Brush** has been elected executive vice president of **Soiltest, Inc.,** a subsidiary of **Cenco Instruments Corporation** . . . **Raymond E. Hoppenrath** has been named manager of the concrete equipment department of **Leader Iron Works, Inc.,** Decatur, Ill. . . . **The Carpenter Steel Co.,** Reading, Pa., has appointed **Charles H. Harton** to the post of Florida manager . . . The **Florida Limerock Institute** announces the appointment of **Bill Bryant** to the post of engineer-director . . . **R. I. Hahn,** president and director of **Walker Manufacturing Company,** was named to the board of directors of the **Modine Manufacturing Company** at the annual stockholders meeting recently . . . The election of **James R. Chambers** as 1961-62 president of the **Illuminating Engineering Society** was recently announced . . . **Bruno Leon** has been appointed chairman of the **University of Detroit,** department of architecture.

Mr. Chipp

John F. Vyverberg has been named marketing manager, Industrial Sales, for the Industrial and Commercial Construction Materials Division of **Owens-Corning Fiberglas Corporation** . . . Appointment of **G. William Loveday** to the newly created post of manager-product planning, **Flexible Tubing Corporation,** Guilford, Conn., was announced recently . . . **Philip M. Dinkins,** president, General Aniline & Film Corporation, has been elected to the board of directors of the **Manufacturing Chemists' Association, Inc.** . . . **John B. Chase** has been appointed field engineer for the Cableaire Division, **Computer Equipment Corporation** of Los Angeles . . . **Sparton Electronics,** division of **Sparton Corporation,** has announced the appointment of **Dale N. Woodford** as chief controls engineer . . . **Luis A. Fernandez-Rivas** has been named chief engineer and technical director of **Monitor Systems, Inc.,** Fort Washington, Pa. . . . **International Resistance Company** has appointed **George Stollsteimer** as manufacturing superintendent and **Thomas J. Sullivan** as production control supervisor.

Mr. Vyverberg

Edgar G. Grant has been named director of new product planning for the Military Electronics Division of **Daystrom Incorporated** . . . **W. W. Gould** has been promoted to Nickel-iron battery market manager of **Exide's** Industrial Marketing Division . . . Appointment of **Fred H. Edgar** as division vice president—aluminum sales of the Metals Division has been announced by **Olin Mathieson Chemical Corporation** . . . **Dr. Paul G. Campbell** has joined the staff of the **National Bureau of Standards** to do chemical research on the structure and identification of the organic components of asphalt . . . **Raymond P. Tennes** has been elected to the board of directors of the **Chain Belt Company** . . . **The Griscom-Russell Company** of Massillon, Ohio, has announced the promotion of **Philip S. Otten, Charles D. Steffens** and **Robert W. Schroeder** in its executive sales department . . . **Charles B. McCoy,** general manager of the **Du Pont Company's** Explosives Department, was recently elected a vice president, director, and member of the executive committee . . . The appointment of **Arthur P. Stern** as director of engineering in the Electronics Division of **The Martin Company** was announced recently . . . **Robert P. Butler** has been assigned the New York Area by the **Clayton Manufacturing Company.**

Mr. Grant

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Nuclear Engineering: Making the Atom Pay Its Way

THE less that we know about a given physical phenomenon, the more we can attribute to it in terms of practical uses. The problem is to convert this initial and incomplete knowledge into economic reality."

The speaker is John F. Kaufmann, with the Reactor Development Division of the Atomic Energy Commission. His basic idea is perhaps the perfect thumbnail sketch of the state of atomic energy today, the kind of work that is being done in this field, and where future efforts will necessarily be directed.

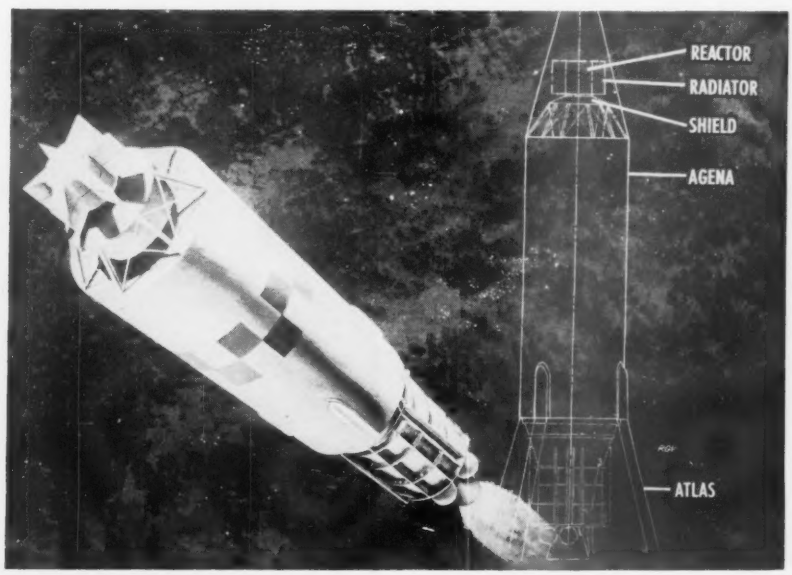
At the same time, and a different context, his statement might well serve as a definition of engineering and the classic role of the engineer in any development project. Taken together, the clear implication is this: The practical application of atomic energy today offers the American engineer one of the greatest challenges he has ever faced, one with present and eventual benefits for mankind that are equally beyond all normal means of comparison.

Development of atomic power presently stands at something of a turning point. Its basic lines of development are fairly obvious and many of the necessary basic research problems have been overcome. While it would be naïve to assume that the physicists and scientists are not going to come up with more basic information, it is still true that there is a wealth of information on hand to be developed from an engineering standpoint. Likewise, considerable experience has already been logged with atomic energy work.

Given the present state of work in this area, from a business standpoint there are essentially two ways in which atomic energy can be used. The first takes in those areas where there is simply nothing that can compete with the atom for

Not much bigger than a shoe box, this SNAP-10 nuclear reactor with no moving parts was developed by Atomics International Division of North American Aviation, Inc.

Putting the atom into space has become one of the most interesting phases of current nuclear engineering work. Artist's conception here shows one method of achieving atomic powered space equipment, using a SNAP-10 reactor and the Atlas-Agena booster system.



doing a particular job. Only atomic energy can give the submarine the tremendous versatility it has achieved in the past few years. While there may be cheaper ways of building submarines, no other means of power will do the same job. Thus, assuming the job must be done, the cost is secondary.

This is also likely to be the case in many space activities. As this is written, the United States has launched its first atomic power package into orbit, and it seems sure that many similar experiments will lead to wide use of this source of power in space exploration. Solar power, at least at present, is not plentiful enough to do any but the most minor jobs. Chemical fuels, for propulsion, are too bulky, heavy and limited for any extended space exploration work. Comments AEC Commissioner Loren K. Olson, "Nuclear rockets will provide specific impulses—or thrust per unit weight of fuel consumed —two to three times the values that can be obtained in chemical combustion rockets. Nuclear energy is, in fact, the key to space travel—the only means of obtaining the complete operational independence from earth necessary to explore the planets of our solar system."

This is a strong statement, but one that is hard to argue with. The job, plainly, is to find and develop the means to these ends, to find out how to get the job done, not how to compete with other power sources. There is simply no competition.

For the engineer, perhaps the more obvious and logical line of endeavor is in the other basic area of atomic development, or where atomic energy is a potential competitor for other energy sources. Because of the new state of the art, atomic energy has not yet significantly tapped these markets. While the basic techniques for many of these applications are understood, they are as yet undeveloped. Atomic engineers today know how to convert atomic energy to electricity, they know that there are important heating jobs which can be done with atomic energy, and they are aware of many other possible applications. But in each of these cases, atomic energy is competing with some other form of power, which is well under the cost involved in atomic power, at least for the time being.

It will be the job of the engineer to attack this particular problem, for he has the basic information available to him, and the job of turning raw scientific material into something usable and profitable has historically been the engineers'. Receiving the most attention in this line at the present are maritime propulsion (other than submarine), electric power and heat processes. Ulysses M. Staebler, also in the Reactor Development Division, sums up the problem this way:

"In these applications, nuclear power must compete economically with other available methods for doing the same thing. Thus the challenge is not to develop systems capable of doing things which could not be done before, such as long term underwater operation or interplanetary space travel. Rather, the challenge is to extend man's available energy resources for economic expansion and continued improvement in living standards. In the short term, the problems of achieving economically competitive nuclear power are particularly challenging since this new technology, with relatively small volume in its operation, must compete with well established but still improving technology for using fossil fuels in an industry of tremendous operating volume. In the longer

Nuclear power applications range from the immediately practical to the near-visionary. Just a sampling would include (top left) vulcanization of rubber tires, (center left) monitoring of flow without interrupting flow, (left) measuring thickness of materials such as mastic tile, and (right) using atomic energy in space to provide world-wide television transmission. It has been excellence of engineering that has enabled present applications of the atom, and the future of the atom will rely on continued engineering efforts.

term the challenge combines economics with the requirement that the reactors and processes used also will extend our nuclear energy resources through high neutron economy and breeder systems."

Backing up this view is Commissioner Olsen: "Our immediate goal is to reduce the cost of nuclear power to a point where utility management in high cost fuel areas can make a decision to build large nuclear power plants on economic grounds alone by 1968."

John Kaufmann hedges the statement a bit: "There can be no question that atomic energy will compete on these grounds. The only point of dispute is 'When?' " The determining factor will be how soon practical needs and economic realities can be brought into focus. Comments Kaufmann, "We heard such a great deal of talk about turning our deserts green by using atomic energy, but little has come of it. I think it should be pointed out that we could do that particular job with enough coolies carrying buckets, but it's not economically feasible to do it either way." If the quip is less than 100 per cent accurate, it nonetheless contains a large grain of truth. The need is for realism and cold practicality.

THE problems in solving this economy/potential equation are enough to give a strong man nightmares. In generating electricity, for instance, one AEC man plots a loss line for building nuclear power generating facilities in terms of investment vs. power output. Volume is the boon of nuclear energy and beyond a 75 megawatt capacity, nuclear power begins to become truly competitive. But between 50 and 75 MW, the loss line hits its nadir. The vast majority of the powerplants in the United States, and in fact throughout the world are between 50 and 75 MW capacity.

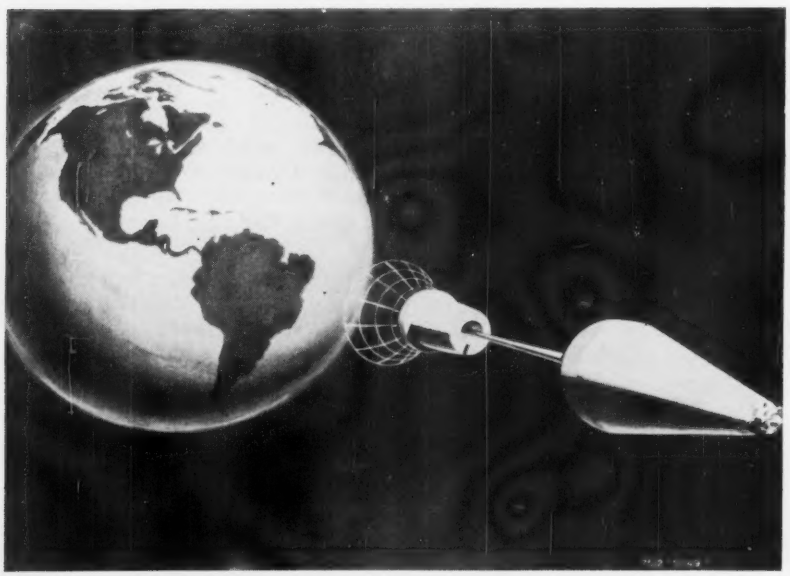
Further, one of the big problems for AEC and private industry is to select the best type of reactor in terms of economy. Boiling water reactors, gas-cooled reactors, and sodium cooled reactors are all under development for various activities in the field. The problem is something like picking a winner in a horse race without knowing where the finish line is. To carry it one step further, there is really no way of telling what fresh horses will appear on the track halfway through the race.

For AEC this creates an extremely delicate situation. Most reactor development work is subsidized by AEC at the present time. Given the many available alternatives for the development of an economical reactor, AEC must bend over backwards—first, to insure that no promising development fails to receive equitable backing, and second, to spend its money where there is a fair chance of some return. Points out one AEC staffer, "For all we know electric automobiles may be better than gasoline-powered cars, but the industry is irrevocably committed. In atomic energy application, we can't be a party to such a final commitment so early in the game."

For industry the situation is equally fraught with problems. Taking one example there is the General Atomic Division of General Dynamics Corp. Their work is being based on a high temperature gas-cooled reactor (HTGR). One AEC official calls this line of development "a real bold step." At present, light water reactors are probably nearest to being economical, and the most thoroughly proven system of generating electric power with nuclear energy. General Atomic has based their work on the assumption that water cooled reactors have limitations in many kinds of work. The assumption is almost certainly valid, given the existing conditions. Also, the GA reactor would theoretically use thorium, as opposed to uranium.

Since GA made its original proposals, uranium has been considerably lowered in price, precisely the factor that had made thorium look more attractive. Although the HTGR is undoubtedly an advanced concept in reactor work offering many advantages over water systems, the comment of one AEC scientist is worth noting: "This is a highly volatile field. Right now, on paper, HTGR looks very promising in relation to boiling water. But HTGR isn't built yet, and I don't suppose anyone expects General Electric, for instance, to simply stand still so General Atomic can catch up."

It is a patently risky business. Consider the comment of E. B. Tremmel, director of AEC's new office of industrial participation: "The private nuclear industry in this country has grown considerably over the past five years, but it would be a gross exaggeration to say that the industry is enjoying a high level of prosperity at the present time, despite the large sums currently being spent. In fact the reverse is true, and I am concerned about the present status of the nuclear industry."



In this, and many other problems relating to atomic energy, AEC is caught in the middle. Rightly or wrongly, atomic energy has historically been under the control of the government, dating back to the need for fast development and secrecy during World War II.

This situation has been criticized from many quarters in the past, and the AEC is currently striving to get more work out to industry wherever appropriate. Without question many areas of the technology will probably never be wholly turned over to private industry of which the fabrication of nuclear weapons is the most familiar example. (AEC does, however, use private contractors even in this case, although within its own facilities.) Beyond this, there are a number of areas in which the Atomic Energy Commission is likely to remain active for some time to come. The reason comes down to a simple matter of economics. There are few private firms in the Nation big enough or willing to invest the huge amounts of capital necessary to carry out a major program of nuclear development.

Against this situation, the development of nuclear power is clearly to the advantage of the United States as a nation, and perhaps by default, the government is currently bearing a significant part of the load. In the case of the HTGR reactor, for instance, the AEC is absorbing some $12-million (for R&D) of the total $50-million estimated cost. However, much of the work that the Commission is presently doing aims to the fulfillment of a policy of greater industrial participation in the field of nuclear energy. While the process of following this policy through is a slow one, it is nonetheless being pursued from a number of angles and has already shown some significant results.

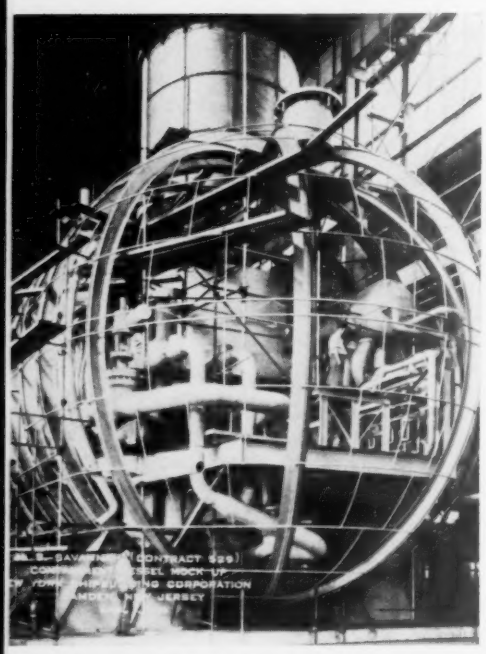
THE most obvious attack on the heavy Governmental control of nuclear development has been to make available more information to interested and qualified parties in industry.

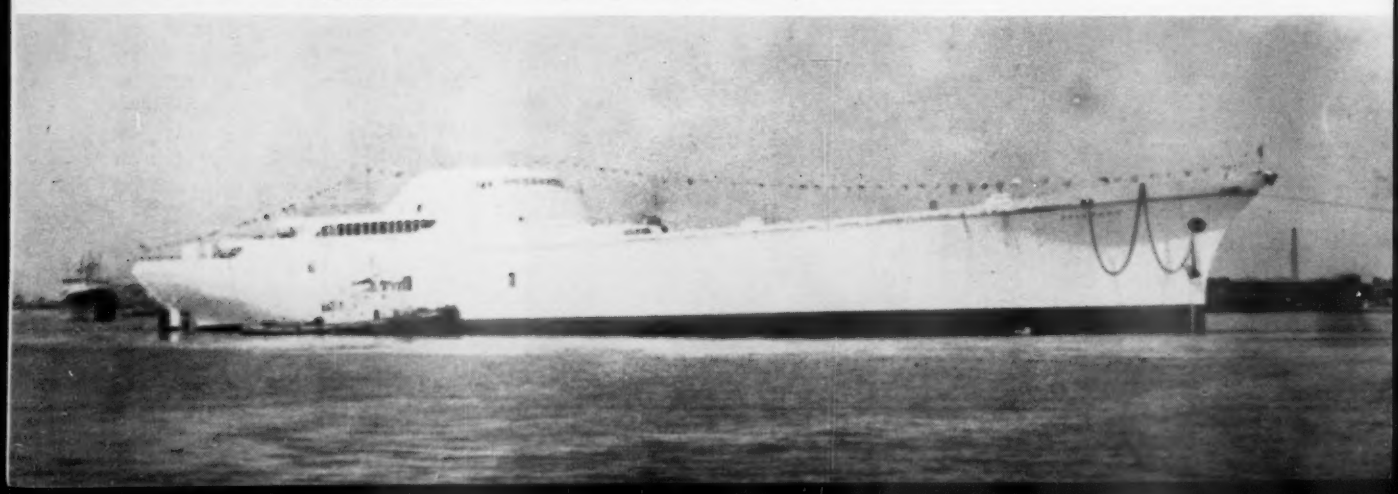
The most dramatic recent development has probably been cutting of the price of uranium, making this basic material of nuclear research available to a wider number of interested businesses.

In the long run, probably the most significant recent step towards this goal has been the formation of an Office of Industrial Participation, formally recognizing the desirability of getting more nuclear business out to industry. Previously, this particular job had been shunted hither and yon within the AEC organization. As an obvious result, the job probably wasn't receiving the attention it warranted, and quite logically, not being done as well as it should have been.

The new office, set up under E. B. Tremmel, will have three basic duties: (1) It will provide a focal point for industry to obtain information on opportunities for private participation and investment in the development and use of atomic energy for civilian purposes and in support of Government programs; (2) it will study industrial type activities now being, or to be, performed by AEC operating contractors which might be carried out by private industry and recommend to the Commission policies, plans, and programs for the transfer of such activities to industries when warranted; and (3) it will appraise and report on the effectiveness of the Commission's policies and plans for broadening industry's participation in the program.

(Continued on Page 57)





Power plant (left) for the nuclear ship *Savannah* (below) will probably undergo sea trials—along with the ship—this year. Aim of the program is to determine the feasibility of competing with conventionally powered ships by using atomic power.

FROM WASHINGTON

BY
MILTON F. LUNCH,
N.S.P.E.'s Legislative Counsel

Military Money Rider ►

Present indications at this writing are that the hassle over defense contractors charging the government for advertising will be compromised by permitting them to include advertising for engineers, scientists and other key personnel in allowable costs. The issue revolves around a rider on the 1962 military appropriations bill passed by the House barring any funds being spent for "paying the costs of advertising by any defense contractor." Pentagon chiefs have backed the rider in principle, but recommended softening it to cover personnel advertising, obtaining of scarce materials and disposing of surplus materials. Deputy Defense Secretary Roswell L. Gilpatric said "we agree wholeheartedly" that "institutional and promotional" advertising by contractors should not be allowed as a chargeable cost. Representatives of trade and technical journals contend the rider will deal a severe blow to their ability to disseminate vital information of a technical nature on new developments in specialized fields. Pentagon chiefs are reported to feel that the exception for recruiting ads is urgent because this is the best and cheapest way for defense contractors to find hard-to-hire engineers, scientists and technicians. If this avenue is closed the defense firms will turn to more expensive forms of recruiting which would not be affected by the rider.

◄ *Priority Rights Protested*

The Nation's educators are striking back at current proposals to give the Federal Government primary rights to any scientific or technological information resulting from research supported by government funds. A Special Committee on Sponsored Research of the American Council on Education declares that the bill by Senator Long of Louisiana is so broad that it would go beyond patentable results of research and "would attempt to control all fruits of intellectual activity." The Council's committee says the bill would encompass any scientific or technological information resulting from research sponsored wholly or in part by government funds, and would create a Federal agency to determine the proprietary interest of the Government in scientific and technological information.

"Under present contractual security requirements, scientists are free to publish and disseminate their findings providing there is no violation of security classification status. The present system permits immediate and full disclosure of research results regardless of the origin of the sponsorship. The result is a rather unsystematic, yet very spontaneous and effective, dissemination of findings as they are made. The dissemination takes place in dozens of professional journals and in the hundreds of professional meetings, regional and National, that are conducted by the scientific community. Government research as well as private research benefits from this interchange. To deprive investigators working on sponsored research of the right to disclose their findings, based upon the government's proprietary interest, will be to reduce the quality of such sponsored research and at the same time to increase its cost and retard its completion. Scientists agree that without the free ability to disclose, consult, and compare findings, worthwhile output of a high order would soon disappear."

The educators also oppose the bill because it would hamper the

traditional incentives for academic growth and advancement through restrictions on publishing research findings. "This right is considered to be a positive intangible benefit of each scientist's university affiliation." The statement adds that the proposed Federal Inventions Administration would require a staff fully as technically competent as the Patent Office and considerably larger in order to evaluate both patentable material and other proprietary information.

Prepublication Information ►

"Have the Federal agencies capitalized upon the 'revolution' which has occurred in the science of information storage and retrieval?" The answer is largely in the negative according to Senator Hubert H. Humphrey, chairman of the Senate Subcommittee on Reorganization and International Organizations. The Minnesota solon based his conclusion on a 278-page report, "Coordination of Information on Current Scientific Research and Development Supported by the United States Government." He added that the agencies have been preoccupied with the far-from-solved problem of management of the *published* literature, but have paid comparatively scant attention to the "mountains" of data on work in progress, which may remain relatively unknown for years, and, sometimes, forever. The report offers no panacea, Senator Humphrey stated, but proposes a number of steps to effect a Nation-wide complex of integrated systems on pre- and post-publication information, the purpose of which would be to permit rapid fire exchange of indexed data on work in progress and work completed. "What this report does is to submit to science a tool for science. It seeks to harness a 'revolution'—for storage and retrieval of information on prepublication work." The full report contains a wealth of data on Federal engineering and scientific programs and organization and reviews present science information services.

◄ Texas Tower Turmoil

Widows of eight of the twenty-eight men who died in the collapse of Texas Tower No. 4 off the New Jersey coast last January have filed suit in Federal Court for $2,800,000 in damages. The claims are against the Federal Government, and Moran, Proctor, Mueser & Rutledge, consulting engineers for the project; Anderson-Nichols & Co., architectural engineers; and Morrison-Knudsen Company, Inc., contractor. Shortly before the filing of the suit the Senate Preparedness Investigating Subcommittee issued its report and findings following an extensive investigation. Based on the testimony in the 288-page hearings, the Subcommittee concluded:

(1) "A substantial portion of the responsibility for the defects, deficiencies, and inadequacies in the design and construction, and in some cases in the repair, of Texas Tower No. 4 rests squarely upon the Bureau of Yards and Docks of the Department of the Navy.

(2) "The design criteria was clearly inadequate. Those charged with the responsibility for its determination, the Navy's Bureau of Yards and Docks and the structural design engineers—the firm of Moran, Proctor, Mueser & Rutledge—underestimated the environmental wind and wave forces to which the tower would be exposed during its anticipated 20-year life in the Atlantic Ocean. The forces of wind and wave which exceeded this criteria should have reasonably been foreseen on the basis of the findings from the feasibility study conducted by the structural design engineers and approved by the Navy. The structural design engineers miscalculated in believing that the design criteria was reasonable and safe.

(3) "The subcommittee seriously questions the wisdom of using for the first time, on a structure such as Tower No. 4, an untried, untested process which had not even been considered as a method of erection by the Navy's Bureau of Yards and Docks until after the inventor thereof was employed by the structural design engineering firm."

Other subcommittee findings and conclusions deal with the technical details and developments which led to the collapse. The full hearing and report constitute almost a "textbook" on structural engineering.

The Engineer—A Member of Management?

Should this engineer remain at his drafting board, considered only another employee . . .

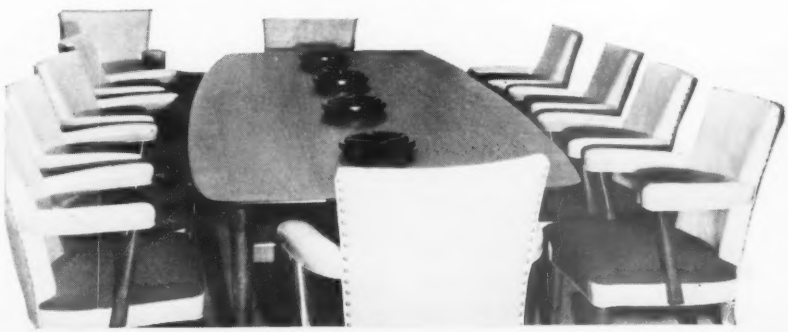
By
JOHN D. KEMPER, P.E.
Vice President — Engineering
Marchant Division
Smith Corona Marchant, Inc.

THE statement is frequently heard these days that engineers should consider themselves members of management. Engineers are prone to scoff at this, and sometimes accuse the makers of such statements of not believing them either. By what right does an engineer equate himself with management, anyway?

Since it frequently happens that management people are the ones who originate these statements, the question might be turned the other way around. Why should management try to include engineers as part of their group? Some engineers have leaped to conclusions on this, feeling it is a sneaky maneuver by management to forestall any demands which engineers may make by substituting aspects of status. Also, in today's world when engineering unions are prominently in the news, some believe that management puts out such statements as propaganda in order to forestall union organization.

But do such suspicions really hold water in the face of the facts? Granted, it has happened in the past that some managements have caused their engineers to feel like so many factory hands, but this just as frequently results from poor attitude on the part of the engineers, as from the management people themselves. For example, if an engineer, presumably a professional man, walks away from his job precisely at quitting time in the face of a burning crisis that is his responsibility, then he is himself behaving like a factory hand, and deserves to be treated like one. Or, if he indicates by word or deed that he believes seniority to be the overriding criterion in promotion or salary advancement, then he is being less reasonable even than most factory workers, who generally

. . . or should he be given a seat at management's decision-making table?



will admit that seniority can only be a factor when all other aspects are equal. Or, if he demonstrates in any one of countless other ways that petty superficialities are the guiding lights of his existence, and that he allows these things to submerge such qualities as performance, sincerity, reliability, and thoroughness, then again he has only shown that he thinks and acts in a way which divorces him from any aspect of management action and behavior.

Most of us will agree that such persons are not especially deserving of our sympathy. But this still does not throw much illumination on why an engineer should regard himself as a member of management. Let us look at some factors which might be regarded as definitive marks of a management person.

First, and above all, a management man is a person who cares. He feels a sense of personal responsibility that his own acts will have an identifiable result upon the future of the business. By the same token, he realizes that his failure to perform certain acts will have a deleterious effect upon that future.

Next, he makes decisions. He is in a position where his action, or his failure to take action, have a definite effect on the course of affairs. Such decisions are most likely taken as the result of independent thought and are not likely to be the result of community (committee) action.

He takes the over-all view. In collecting data in preparing to make a decision he does not confine his view to only those affairs which are within his immediate department or division, but tries to assign values to other aspects of the business, thus to determine the ultimate effect upon the whole. Another way to say this is that he makes his decisions with the company's good in mind, and not only the good of himself or of his department.

Senior Design Engineer (r) receives assignment from Project Engineer. He will now carry responsibility for his portion of the project from initial concepts through entire program, including early production.

WOULD anyone want to disagree with these definitions? Probably not, and yet they are almost completely at variance with the standard conception of what constitutes a management man. Our great American public, since the days of Horatio Alger, has been schooled to believe that management spells success, and that management means supervising people.

What nonsense! A man may supervise people, be revered for doing so and never even come close to being a management man. Because in his supervising of people, it is possible that he (1) may *not* care; (2) may never make any real decisions, and (3) may, with relentless consistency, look to his own good first and the company's good not at all.

It is to be hoped that such a man will not last long in his exalted position, since he obviously not only fails to support the company aims, but is also actually a malignance which is an effective barrier to the achievement of those aims.

An allied concept, almost as absurd, is the idea that a man cannot possibly be a management man unless he has a private office. No doubt this thought has its origins in the same place as the foregoing one, since a man who supervises others generally *does* need a private office in which to conduct private conversations. But a private office, all of itself, has little to do with the real essentials of management.

Perhaps it is evident, from an examination of the definitions given before, that a man need not necessarily supervise anyone at all, or be possessed of a private office, to still legitimately consider himself a management man. There are other things to be managed besides people, two of such being materials and money.

Let it never be thought that the management of money is only for the financial department and foreign to an engineer's job. A little reflection leads one inevitably to the conclusion that the only possible justification for the fact that the engineer exists at all is that he is supposed to be able to accomplish a given job for less cost than some guy directly off the street who lacks his skills and attitudes.

A helpful thought to bear in mind here is the one about giving an infinite number of typewriters to an infinite number of monkeys, and, given an infinite amount of time, will result with one of them eventually typing out the Gettysburg Address. Trial and error methods presumably will get there eventually (at infinite cost?), but something more than this is expected of the engineer.

The ramifications of this cost aspect are extreme. The fledgling

engineer is likely to think that the "costs" for which he is held responsible extend mostly to those items he purchases for his experimental models, or the amount of paper and pencils he consumes, or perhaps for the efficient use of his time. True. All these items are a part of what he is responsible for.

The more mature engineer of course recognizes that his "cost" responsibility extends deeply into the devices he designs: He must choose his materials and his methods wisely, so that manufacturing cost will not be excessive; he must think constantly of assembly methods and adjustment requirements so that his savings of materials and/or parts do not jackknife on him in terms of impossible hours of assembly and adjustment manhours; he must think always of the salesman and the effect upon this long suffering individual if he makes a bad decision; he must think about the serviceman's problems and what will happen if such-and-such a part breaks, wears out or loses adjustment.

But it is a rare engineer who perceives that his influence in a "cost" way goes far beyond even these items. Every one of the above mentioned factors is important, but they all pale into insignificance alongside something else. This "something else" is hard to define, and its very difficulty of definition is what makes it so important.

A company is constantly making decisions regarding what its future will consist of. This is the number one concentration of management, or should be. That future is going to be based upon products not in existence today. They must come from some place; that "some place" is the minds of the engineers. That may not sound easy and it is even more difficult than it sounds. It does not particularly help to say that the core of this matter rests upon "new ideas," or "inventions," or "patents," or any of the other phrases people generally use to try to pin a neat label upon this process.

I'm not sure it is capable of supporting a very good explanation, since it is likely to consist of a constant tug-of-war between half-formed ideas, incompleted investigations, unknown quantities, "feel," out-and-out luck, or what have you. But rest assured that out of this welter of unknowns and uncertainties must come, sooner or later, some "knowns" and "certainties," or else the company will not have any new products at all. Who creates order out of the unknown? Management? How can they? They can't, at least not all by themselves. They must have help. They need facts to work with. Where do they get these facts? From the engineering department, of course—at least those portions of the facts that have to do with feasibility, manufacturing costs and the like. Perhaps the manufacturing department should be responsible for making manufacturing cost estimates, but where do they get their information as to what the product will look like in order to make such estimates? From the engineers, again. And from these roots spring all else —what the product can do, what it will cost, what it must sell for, and, therefore, how many can be sold as well as whether or not a profit can be made. All the root information, from which all else is built, must come from the engineers. The president of the company may make the actual decision and may seek many essential facts from his financial and marketing departments, but everything these departments are able to tell him is based upon engineering information. If the engineers are wrong everybody else is also wrong.

You might well say, "Yes, quite true. But in the engineering department itself there are *engineering* managers who audit and control these decisions, so how can you say that the individual engineer, sweating away at the desk or drawing board, is a management man?"

I CAN only suggest that you look back into your own career. Have not there been countless instances where a decision or analysis of your own constituted the keystone upon which the engineering department decisions rested? How about a particular design upon which a certain manufacturing cost estimate was based? Who sat down and cudgeled his brains for days in order to come up with a way or ways in which the desired function could be accomplished? The engineering manager? Let us hope not, especially if he has a very large department. If he is the one who regularly does the conceptual design work at the molecular level, then you had better look around to find the other guy who is *really* running the department. In a department of any size, there are bound to be a

In the Test Laboratory, Senior Engineer maintains close supervision over his design. His basic responsibility will not be terminated until a successful pilot manufacturing phase has been accomplished and production difficulties have been ironed out.

number of key people who do the work of creating basic configurations upon which the entire remainder of the house is built.

If they make their decisions well, then the people who come afterward can also do a good job and the company will prosper. But if the engineers consistently fail to put good raw material into the hands of the financial and marketing men, the eventual doom of the company is sealed. Sometimes these key engineers will be managers of people and sometimes not, but they are no less full members of management because of the tremendous influence they wield for good or evil upon the future course of the business.

But what of the other engineers, who may not be in position to wield such a far-reaching influence upon the company? What about the engineer who enters the project at a time when someone else has already selected the basic configuration? You might look at it this way: An idea which may be excellent in its original conception can still easily be ruined during any subsequent stage. That word "easily" needs extra strong emphasis. Many organizations have floundered because they thought the original conception was the major part of the battle and that subsequent stages (perhaps glossed over by terms such as "drafting" or "production engineering") followed in a more or less routine way performed by second line people.

One of the easy ways to ruin a project is to short change the step between original conception and actual hardware design. This stage requires the highest and the finest of all qualities we may admire in an engineer. A project may consist of millions of detailed decisions, all of which must be made expeditiously and well, if the project is to prosper. A failure at this stage of the game to exercise to the fullest all three of the management characteristics listed earlier can result in ultimate collapse. The collapse may not come immediately but may be built into the project so that its effect is delayed for months or years. The engineer working directly at the board is the only one who is in a position to make all these detailed decisions. Part of the time he may not even be aware of the importance and frequency of the decisions he makes. His supervisor and other people up the line reviewing his work can hardly hope to second guess him. His work must either be junked entirely (and maybe the man, too) if it is unacceptable, or else his stuff goes through substantially unaltered. Even if major revisions are undertaken, some engineer, probably the same one, must go back and tackle the rock pile again. Once more it is an individual engineer's decisions which will largely determine what comes out the second time around.

Even later as the project enters production countless decisions are needed. Their cumulative effect is immense and it is the engineers who make them. In fact, it is at the stage when the device enters production and during its early production life that the greatest demands may be made upon those qualities of the engineeer which mark him a management man. Few products go into production without experiencing many crises. During these crises all eyes focus on the engineer who now must make the best possible decisions while under the buffeting of demands from all quarters.

Hopefully, we have now dispensed with some of the chaff surrounding this issue and can see the essence of the matter. It is simply this: The engineer must make daily decisions which, in the aggregate, have a profound influence on the company's well-being. He is constantly faced with the same conflicting issues which confront the president of the company himself, and he resolves those issues using the same guideposts as the president does. He is concerned with the effects of his acts upon all branches of the company; he must wring the maximum advantage from his conflicting issues, doing so at least cost and with the most efficient use of his own time.

I once heard an old timer say that the mark of whether or not a man was an executive was whether he had to "make most of his decisions alone and with only God to help him." The thought has many merits. An engineer who is worth his salt is not constantly running to others to make his decisions for him. As he grows and develops experience, he makes more and more of his decisions "alone and with only God to help him," and by virtue of this he becomes more and more the management man.—End

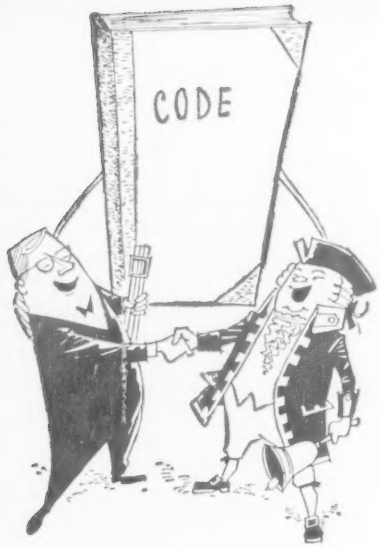
Coming in the September Issue of AMERICAN ENGINEER . . .

- **What is Wrong with High School Mathematics?**
- **NATO, MWDP and the P.E.**
- **Engineering Documentation—as reviewed by a leading executive.**

About the Author . . .

Mr. Kemper

John D. Kemper, P.E., has been with Marchant Division of Smith-Corona Marchant, Inc., since 1958, serving as vice president in charge of engineering since 1959. He had previously served H. A. Wagner Co., of Van Nuys, Calif., as chief mechanical engineer, and Telecomputing Corp., Hollywood, Calif., as division chief engineer. He received both his B.S. and M.S. degrees from UCLA in 1949 and 1959 respectively. He is a member of ASME, Tau Beta Pi, and the Engineering Advisory Council of the University of California.



Ethics Engineers and Publicity

By

HAROLD A. BERGEN, P.E.

Vice President

Burson-Marsteller Associates, Inc.

Ethics, engineers, and publicity are highly compatible with each other. In fact, the ethics of the truly professional engineer demand that he engage in publicity. I will admit that this is not a widely held view, but I would hope to convince some of you.

Let's begin by recognizing the need for effective, worthwhile communication between engineers and the lay public as well as among engineers themselves. The increasing need stems from the increasing dependence placed upon engineers by others. Increasingly, engineers are called upon for information which ultimately determines the disposition of public money for public works, of corporate money for capital expenditure and operating expense, of private money for investment, and of money for education to train future engineers. Beyond these pragmatic considerations, engineers are beginning to feel a general compelling desire for public recognition.

Yet, meaningful and worthwhile communication between engineers and others lags far behind these real needs. Possibly this happens because engineers equate communications with publicity of an unprofessional nature. The mantle of ethics that we engineers seek to cloak about ourselves, to most of us at least, seems to be incompatible with such communication as can be called publicity.

Yet, engineers have been striving for professional status for as long as our calling has existed without really knowing why. Our strivings in recent years—the last ten years—seem to be more vigorous than any in the past. "Why," may be a mystery to some of you, but I submit that much of the vigor we have put behind our seekings after professional status in recent years is a response, in reality, to the stepped up pace of communication (or publicity) by which all callings are bombarding the business, professional and general publics.

More people and more groups are seeking recognition by the reading, listening and viewing public. Each interest must hustle ever more furiously to match the voice of others if only to avoid being submerged in the background. Engineers subconsciously feel this pressure, and yet we professional engineers in particular saddle ourselves with unnecessary and imagined restraint. Engineers somehow feel they cannot speak to each other or to the lay public about the things they do without somehow violating the integrity and honor of the professionalism they seek to establish, even though they feel a gnawing desire for recognition. So we remain silent in the face of the need to publicize our profession to ourselves and the lay public.

I submit that professional ethics, engineers and publicity about engineers are compatible. I go so far as to say that our ethics demand more publicity about the things we do than many of us would realize. How is this so?

My contention stems from the very source of our ethics as engineers. Yes, the demands that engineers publicize themselves are rooted in the "Canons of Ethics for Engineers."

Let's see first what the Canons demand of us and what the Canons forbid us to do. Then we shall look at publicity to establish what I contend is the proper and ethical relationship of engineers to publicity and professionalism.

The Canons demand many

things of us engineers, including the following (Italics are the authors):

In Section 1: "The engineer will cooperate in extending the effectiveness of the engineering profession by *interchanging information* and experience with other engineers and students and by contributing to the work of engineering societies, schools and the scientific and engineering *press*."

In Section 3: "The engineer will endeavor to *extend public* knowledge of engineering. . . ."

In Section 20: "He will take care that *credit* for engineering work *is given* to those to whom credit is properly due."

So the Canons *order* that we interchange information, that we extend public knowledge, and that we give credit for engineering work where it is due. These are orders from the Canons. They are not optional; they are not merely suggestions; they are commands. These commands are accompanied by restraints that tell us how we are to carry them out.

The Canons, quite properly establish the following standards for us (author's italics):

In the Introduction: ". . . the keystone of professional conduct is integrity . . . ."

In Section 2: "He will not advertise his work or merit in a *self-laudatory* manner . . . ."

In Section 77: "He will refrain from expressing publicly an opinion on an engineering subject *unless he is informed* as to the facts relating thereto."

So, to discharge our professional obligations—yes, to be truly professional—we must publicize our profession and the work we do.

AMONG the professionals in public relations, the classic definition of public relations is "doing good work and letting people know about it." "Publicity" is the communication about the "good work." For our purposes, we must be sure to recognize the importance of "doing good work." Having done good work, I contend that publicizing it can be done by engineers, ethically.

Many times publicity is associated with movie stars, political figures, pressure groups that try to influence Congress and legislatures, soft drinks whose names are scribbled in the skies, beauty contests, vacation area promotions and the many, many similar efforts in which the publicity techniques of public relations are used to let other people know something. By contrast to our interest in the definition of public relations, the "doing-good-work" phrase is a neglected prerequisite.

We engineers, true to the principles of our Canons, hold our tongues until we are sure of what we say out loud, and double-check our assurances at that. We have been indoctrinated with concepts of integral-number safety factors, with alternate sources of power, with the protection of life and property by conservative design to the point where saying anything about what we do appears incompatible with publicity as defined by bikini bathing suits and skywriting.

But if we return to the definition of public relations, "do good work and let people know about it," and if we return to the commands of our Canons we discover a basic compatibility between ethics, engineers and publicity.

Let's take an example. Assume that Zilch, Zilch and Zilch, consulting professional engineers, have designed and supervised construction of a limited access highway. New highs in safety and economy have been designed into the highway. Mr. Abner Zilch, senior partner, is proud of what his firm has done. He is particularly proud, with documentable justification, of the double-involuted access ramps devised by Fred Grogg, his chief civil engineer. Good work has been done in the public interest.

Does Mr. Abner Zilch hold his tongue? Does he avoid discussing the project at luncheon with a prospective client? Does he refrain from discussing it in the locker room of his country club? Does he keep it a secret from the vendors who must supply the rebars? Does he never mention it to his wife? He does not. He does good work and he publicizes it.

I contend that Mr. Zilch has the obligation, as you do, to multiply the word-of-mouth publicity he personally gives by the many channels of communication that our modern civilization provides.

Just as Mr. Zilch is obligated to his family to provide them with all protection from the elements provided by a modern home, he is obligated to employ the methods of modern communication to tell people of the good work he and his associates have done. Ethically, he cannot live in the dark ages of the

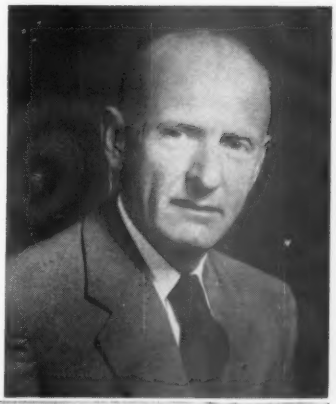
(Continued on Page 56)

About the Author . . .

Mr. Bergen

Harold A. Bergen, P.E., vice president of Burson-Marsteller Associates, Inc., public relations firm, graduated from Illinois Institute of Technology with a bachelor's degree in electrical enginering in 1950. Besides being a registered professional engineer and a member of NSPE, he was founding president of the Chicago Chapter of the American Public Relations Association, and was recently elected a national director of APRA. He is also a member of AIEE, ASME, and the Western Society of Engineers.

Professional Profiles



Arthur Blessing, P.E., now city manager of Schenectady, N.Y., is shown here with a before/after view of one of Schenectady's intersections, typical of the city improvements he has instigated and supervised in 36 years of service.

ALTHOUGH my professional career over the past thirty-six years has been confined almost entirely to local government here in Schenectady, I must admit that one gains a great deal of personal satisfaction starting out operating a transit, working from time to time at almost every phase of city operation and finishing up in the chief executive position of our local government. Schenectady, indeed, has been kind to me, for which I am very grateful."

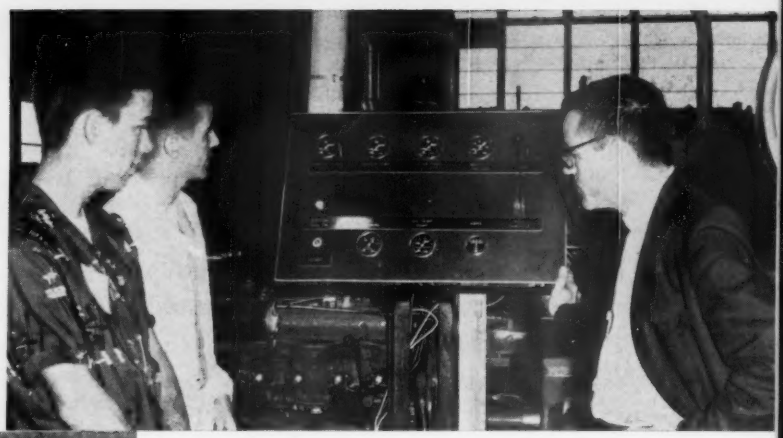
These are the words of Arthur Blessing, P.E., city manager of Schenectady, New York, who directs a government body serving 100,000 people, and serving them well. The list of titles that he has held with the City of Schenectady bear out his own words, and provide an excellent picture of professional progress and development. Arthur Blessing began with the city as an instrument man in the engineering department in 1924. Next, he was an assistant engineer, designing engineer, project engineer, senior engineer, director of the Department of Traffic and Planning, director of planning, technical consultant to the Schenectady Municipal Housing Authority, Technical advisor to the Board of Zoning Appeals, and, in 1954, he became city manager.

Born and raised in Schenectady, Blessing was educated in the Schenectady school system, then received his bachelor of science degree in civil engineering from Union College. At Union, he was an honor student, winner of the Civil Engineering Prize, and an associate member of Sigma Xi, an honorary scientific fraternity at the school.

During his career in Schenectady, the jobs Blessing has handled truly cover just about every phase of city administration. Here is a cross section: Storm and sanitary sewer design and construction; land surveys, including subdivision development and topography; bridge design and construction; building design and construction; traffic surveys; design and construction of a city-wide interconnected traffic signal system; planning and zoning, including population studies, and land use; street widening and extension; housing; transit; transportation; schools; recreation; capital improvement programs; preparation of a zoning ordinance; preparation of local laws; and property valuation.

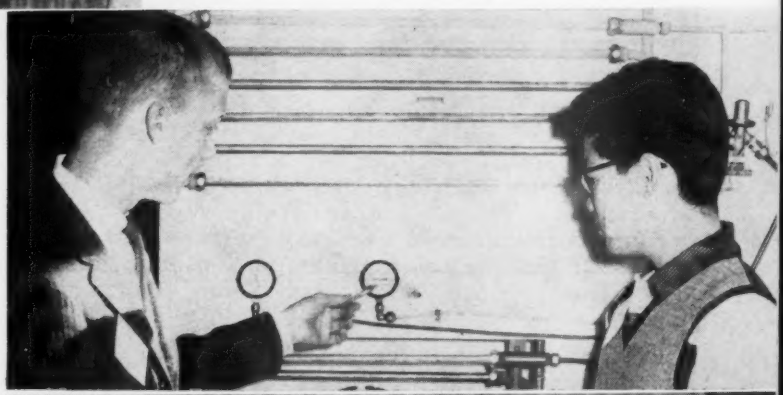
If somebody were to ask for the definition of a full and satisfying career, or for a definition of public service, or for a definition of what an engineer can do to increase the public welfare, they would only have to look to the city manager of Schenectady, N. Y., to find the answer. As an active and public-spirited member of his profession, Arthur Blessing, P.E., exemplifies precisely these things.

High School Students attending California Polytechnic Institute's Engineering Preview learn just what will be required of them in an engineering career. Many students who attended said the Preview had done much to help them make career decisions.



JUNIOR ENGINEER AND SCIENTIST SUMMER INSTITUTES

Panel discussions in which high school students can take part often prove a valuable means of exchanging information. Here, Dean H. P. Hayes of California Polytechnic Institute takes part in such a panel (above).



Practical laboratory work, from an engineering standpoint, gives meaning to more theoretical work encountered by students in high schools. The aim is to let them know what engineering offers as a career.

Informal discussions provide students with answers they may have regarding a career in engineering. The job of the various summer programs is to give the students a general orientation, and allow them access to the answers they may be seeking.

Filling the Gap in High School Guidance

There are many programs to provide the high school student with the facts about an engineering career. In each, the approach is somewhat different, although the goal is basically the same. Question: Is a more unified approach needed?

THIS summer, throughout the Nation there are being conducted literally scores of various programs aimed at providing high school students with basic and advanced information on the facts about and the advantages of a career in engineering.

At its winter meeting, the NSPE Board of Directors voted endorsement of such programs, and in many areas is taking an active part in the forming and administering of programs with this goal in mind. Industry, other associations, schools, and various governmental organizations are also active in this sort of work, as well as one organization in Oregon which makes practically a full time job of running these orientation institutes during the summer holidays.

The curious thing is that practically everybody involved in these programs has a different approach to getting the job done. As a result, it is probably accurate to say that these programs are not necessarily measuring up to their full potential.

Junior Engineers' and Scientists' Summer Institutes, Engineer for a Day, Engineering Preview, Summer Science Training for Secondary School Students, are a few of the titles placed before the high school student throughout the year, and with one clear exception, all of these programs are about the same thing.

Probably the largest single program in the field is that of the National Science Foundation. The aim here is not so much orientation as it is furthering the education of the student involved. Because of the high degree of selectivity exercised by the Foundation, they are confident that the students they get are heavily science-oriented, and can therefore concentrate on improving their skills. The stated purpose of these programs indicates their nature: "The primary purpose of these programs is to encourage high ability, secondary school students to pursue their scientific interests by providing them with opportunities to participate in summer programs especially designed by interested colleges, universities and nonprofit research organizations."

For the same reason that these programs are especially valuable for the would-be engineer, so is there a need for the lower level secondary school orientation program. The reason is simply that engineering is not taught at the secondary school level. The high school student who may have engineering abilities is not given an opportunity in his regular classes to really test himself, and perhaps more important, he may not be given the chance to find out just what engineering is all about, and why it might make the most satisfying career for him.

With a strong suspicion that this was exactly the case, the Engineers Club at Minneapolis-Honeywell Regulator Co. initiated an Engineer for a Day program, bringing in area high school students to show them just exactly what engineers in industry do to earn their salaries, and how engineering contributes to industry and society.

The results of the program were both surprising and gratifying. They were surprising because of the great number of students who departed remarking that previously they had had no idea what engineering was, in terms of a job. The program was gratifying because of the obvious enthusiasm generated in participating students by their exposure to such information.

In a report on the program, C. D. Motchenbacher, P.E. had these comments to make: "Now in its second year, the plan has met with almost unanimous approval and enthusiasm from the participants. The appeal, success and ready workability of the program should give more groups cause to consider setting up a similiar program in their own areas."

Also worth quoting are some of the comments of the students who took part:

"It was exceedingly interesting and I learned much that I would not have otherwise known."

"I am sure that this experience will influence me in my decision as to a profession, which is in the near future."

"Perhaps the program is even more valuable for those, such as me, who are unsure of their future fields, than for those who definitely plan to go into science or engineering."

In terms of orientation, the biggest organized effort to date is that of a nonprofit organization called Scientists of Tomorrow. This group, with its headquarters in Oregon, is the founder and sponsor of the so-called JESSI programs, i.e., Junior Engineers' and Scientists' Summer Institutes. One measure of the program is the success it has met. From its small beginnings in Oregon, JESSI has become truly National. This year for instance, Institutes were planned for thirteen colleges throughout the Nation. Represented in the plans for this year were New York, South Carolina, Colorado, Delaware, Indiana, Mississippi, New Mexico, Oregon, California and Washington State.

THE JESSI programs provide the high school student with two weeks of orientation work in many phases of science and engineering. A course

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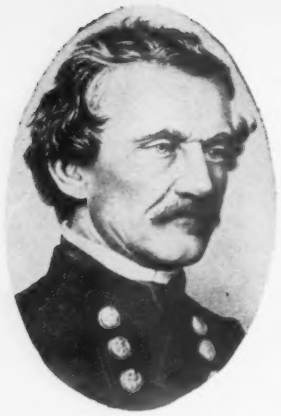


Captain A. A. Humphreys

Centennial 1961

Taming the Mi

JUST about a century ago, Mark Twain—himself something of an expert regarding the Mississippi River—offered the following mildly skeptical comment:

"The Military Engineers have taken upon their shoulders the job of making the Mississippi over again, a job transcended in size only by the original job of creating it."

With all due respect, it is fairly certain now that Mark Twain underestimated the engineers in his skepticism. For in fact, the Mississippi River *has been* made over, as the result of a century of continuing effort on the part of military and civilian engineers.

How big was the job? August, 1961, will mark the centennial of the submission of the Humphreys and Abbot report on "The Physics and Hydraulics of the Mississippi River." This report, besides being the most significant document on river hydraulics in its time, touched off work on remaking the Mississippi that is still continuing, has passed the billion dollar mark in terms of cost, and has returned something on the order of six dollars worth of damage prevention for every dollar invested.

To call the program mammoth would be to understate the case. The remaking of the Mississippi began with, and was made possible by the totally unprecedented efforts of two Army engineers, Capt. A. A. Humphreys and Lt. Henry L. Abbot. Briefly, what these two officers did was to survey both topographically and hydrographically the 1000-plus miles of the Mississippi River from Cape Girardeau, Missouri, to the Gulf of Mexico.

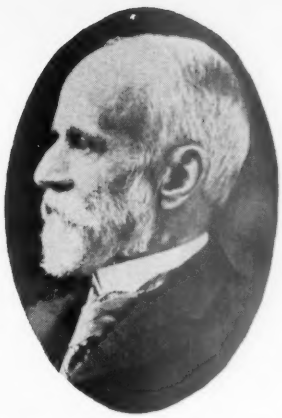
Considering the state of the science of hydraulics at the time, the assignment would be roughly comparable to giving an engineer today a Fourth of July rocket, and telling him to build one that could take a man into orbit. Thus, as they surveyed the Mississippi, they often had to develop the necessary techniques and formulas as they went along. Further, as they completed their job they virtually rewrote the existing textbooks on big river hydraulics.

Before their studies on the Mississippi, Abbot and Humphreys had no guidelines that were of any real help at all. As much information as was available had to do with laboratory experiments, well controlled canals, or otherwise stable and controllable situations. Consequently they had to practically turn the Mississippi into a huge laboratory of their own, experimenting as they worked, and creating the technology they needed as they used it.

Humphreys' statement of the problem before the job began and his evaluation of what he had accomplished when he was through are perhaps the most direct summing up of the technological job. Before starting the eleven-year survey, Humphreys said he "entered upon the execution of that duty with an

Near the Mississippi Delta, and the Gulf, the Missis
size and complexity have combined to form one of t

ghty Mississippi



Brigadier General Henry L. Abbot

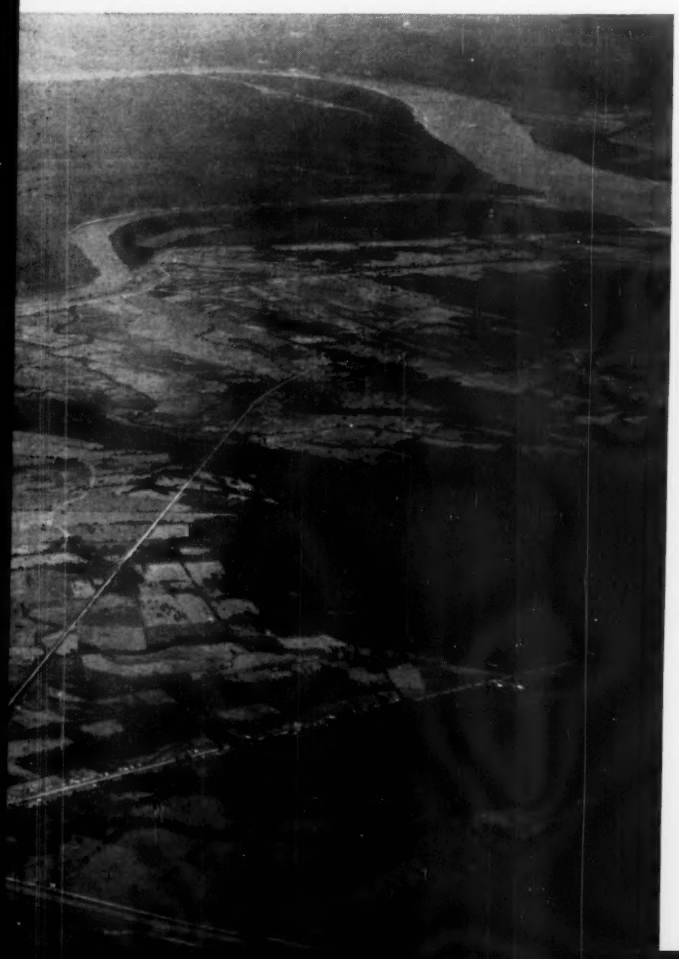
apprehension that the laws of flowing water in natural channels, as enunciated in treatises upon the hydraulics of rivers, were not based upon sufficiently extended experiments upon natural streams, and, hence, the treatises found in them could not be relied upon for the solution of the question upon which the plans of protection against inundation from overflow depended."

In slightly up-dated English, this meant that there simply wasn't anything available in the way of useful or even usable information.

After eleven years of work on the Mississippi itself and in extensive research on other rivers, Humphreys summed up their progress. They had determined "by experiments on a far more extended scale than any ever before attempted, the laws governing the flow of water in natural channels and [means of] expressing them in formulae that could be safely and readily used in practical applications. The success that has attended this part of the work has even exceeded my expectations. Laws have been revealed that were before unknown; new formulas have been prepared, possessing far greater precision than the old; and improved methods of gauging streams have been devised."

The size of the task very nearly defies imagination. The Mississippi has the world's fourth largest watershed, ranking behind the Amazon, the Congo, and the Nile. It drains virtually everything on the North American Continent between the Appalachians and the Rockies, an area of over a million and a quarter square miles, including 31 states and two Canadian provinces. The Mississippi basin extends as far east as New York State, and as far west as Montana.

ppi offers the engineer a plethora of problems. Sheer largest single jobs in engineering history.



IN the spring of 1850 the State of Louisiana called on Congress for some help—flood damage was periodically wreaking havoc on the Louisiana farmlands: Could the Army engineers do something about harnessing the Mississippi? Clearly, before anything could be done to control the great river, ample information was needed. Thus, Capt. Humphreys and a Lt. Col. S. H. Long were appointed as a two-man board to find out what could be done. Preliminary studies showed the project at least worthy of a try. The following spring, 1851, the surveys began.

Field parties began collecting information on old flood marks, the dimensions and construction of the old levees, the size, frequency and nature of breaks in the levees and how they were caused. They chose various points along the river to measure the velocity of the current, examine the sediment and the movement of material along the river bottom, and calculate the effects of wind on water movement. The idea was to learn everything that could conceivably be discovered about the factors and forces affecting the amount and force of water moving in the river at various times, various places and under various conditions.

Work was barely underway on the huge task when Capt. Humphreys became ill, and direct work was suspended until 1857. Although he was too ill to work, Humphreys got permission to travel to Europe with the idea of drawing on technology available there that might apply to the Mississippi job. Having researched work on just about every major river in Europe, and having researched his subject as far back as the Roman Empire, Humphreys came to the following conclusion: Little of what the Europeans were doing was of any practical use to him; they simply had nothing to compare with the Mississippi.

After a short interlude on another surveying job in the West, Humphreys was able to return to the Mis-

Nearly a century of effort, beginning with the Abbot and Humphreys survey, have gone into end products such as this low-sill control structure in Louisiana. Flood control has vastly improved public safety conditions along the river, as well as reclaiming formerly lost farm land.

sissippi, bringing with him Lieutenant H. L. Abbot, who proved to be an able and valuable partner in the huge job. Finding Abbot was particularly good fortune because that summer Humphreys again became ill.

Regardless, the work continued. For practically every job, the engineers working on the survey had to devise new methods, and accurate techniques. In places the Mississippi is up to 110 feet deep with currents running at varying depths. To measure such currents, surveying engineers developed a technique for floating weighted kegs at varying depths with small, light floats attached to them at the surface. The heavier kegs paced the current below the surface, and the light floats provided a means for pacing the undersurface currents.

The river bottom was probed, sediment movement was measured, rise and fall of tributaries were gauged, and self-recording tide gauges were installed at many points. River bottom soil in the Delta was studied for geological characteristics. Mounds and hills found in sections of the river flowing through swamps and bayous were also studied. Some of the mounds were ascribed to ancient volcanic action. Others were comparatively recent in geological terms. Mounds along the bayous near the Gulf of Mexico showed evidence of fire, fish bones, fragments of Indian pottery and human bones. Mounds covered with two feet of moss were found to have large trees growing inside.

In 1860, field work was complete, but there remained the tremendous tasks of putting together the great mass of information that had been gathered in nine years and of drawing useful and worthwhile conclusions. The findings of these computations were, in one word, revolutionary. In his letter of transmittal on the report, Captain Humphreys cites particulars:

"The Mississippi had always been regarded as flowing through a channel excavated in alluvial soil formed by the deposition of its own sedimentary matter. So important an assumption was inadmissable, and great pains were accordingly taken to collect specimens. . . This investigation has resulted in proving that the bed of the Mississippi is not formed in alluvial soil, but in a stiff tenacious clay of an older geological formation. . . .

"Further, it was held by the advocates of the exclusive use of artificial embankments that the levees of Louisiana had already lowered the bed and floods of the Mississippi River, and that their extension throughout the alluvial region above would still further lower the floods by deepening the bed and reducing the slope of the river. . . The advocates of outlets, on the contrary, contended that the experience of many centuries on the Po proved that levees had raised the bed and floods of that river. . . While the

At Delta Point, Louisiana, the work of taming the huge river still continues, as it does in many places along the length of the mammoth river. Here, a mat hauling rig places a stack of mat on a loading dock.

investigations of the Delta Survey have rendered untenable that position of the advocates of the exclusive use of levees on the one hand, the investigations of the Chevalier Elia Lombardini have shown the supposed facts by the latter class to be entirely erroneous. . . .

"The effect of a great swamp like that of the Yazoo upon the floods of the Mississippi, a subject that has formed the theme of speculation for at least thirty years, has also been established by the collection of facts; as likewise the law governing the rise, fall and discharge of the river throughout the alluvial region; the manner in which the flood is prop-

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Inculcating Professional Concepts in Industry's YOUNG ENGINEERS

By
JOHN GAMMELL P.E.

Director of Professional Development
Industries Group, Allis-Chalmers
Manufacturing Company

A place to start, a foreseeable goal, and a number of well-defined steps in between, are all necessary parts of making a young engineer feel he is a part of the profession.

It has often been said that a vital entity of any kind gives great concern to its future. We have all heard the old saying about bringing up our youth in the way they should go so that when they are old they will not depart from it. The early years of an engineer's career are formative and important and the inculcation of professional attitudes and their application must be done vigorously one way or another at this point if we are going to have a generally recognized profession.

The Engineers' Council for Professional Development, among others, has given considerable thought to the first five years of the young engineer's career; literature is available. But before discussing it, I would like to cover some of my ideas on professionalism.

In my experience, I have found that no two people agree on precisely what "professional" means in the larger sense in which we like to use it concerning our engineers. It does, however, mean something extra; it means that those who are truly professional have a special fund of information and skill for the applications available to them in the realm of physical sciences. It means, I think, that they should have a special code of ethics which applies to their particular activities. This code of ethics should be recognized in addition to the general concept of ethics which every citizen must have in order to live with his neighbor. Colton has said:

> Honesty is not only the deepest policy, but the highest wisdom, since however difficult it might be for integrity to get on, it is a thousand times more difficult for knavery to get off.

Ethical activities help us to carry a bigger load since they remove from us much of the harassment of daily difficulties which comes from conduct not generally accepted by our associates. A profession without ethics invokes the Biblical quotation, "They grope in the dark without light, and He maketh them to stagger like drunken men."

I was recently reading a speech of a prominent consulting engineer, Adolph J. Ackerman of Madison, Wisconsin. He states about professional men (engineers), "First of all, he must have an understanding of the society he lives in and of his fellow man. He must be able to envisage and plan the whole of a project in consideration of its economic structure and utility, its sociological impact and its technical details. He must be able to present his ideas effectively and to defend them."

Another excellent remark on this subject was offered by the late Dr. Wickenden in his article, "The Second Mile." He listed four criteria as the distinctive mark of the professional man.

> (1.) A type of activity which carries high individual responsibility and which applies special skills to problems on a distinctly intellectual plane.
>
> (2.) A motive of service beyond that of mere profit.
>
> (3.) A motive of self-expression, which implies joy and pride in one's work and a self-imposed standard of excellence.
>
> (4.) A conscious recogni-

As a part of personal professional development, young engineers are encouraged to write technical articles pertaining to their field. Allis-Chalmers sponsors an annual writing contest, awarding cash prizes to the winners (left).

This assistant chief engineer (r.) of the Allis-Chalmers plant in Pittsburgh, has an understanding of his society and his fellow man. He is serving on a local school authority which recently built a $2,800,000 school and is planning another (below).

tion of a social duty to be fulfilled.

Ackerman also states that "at his highest level of attainment, the personal characteristics of a professional engineer include imagination, vision, courage, special initiative, integrity, independence, leadership, skill and a solid grounding in sound economics and finance. However, these are largely factors of personal development rather than college training. . . ."

Professionalism would seem clearly then to revolve around the idea of understanding the technical aspects of engineering better, and this can be done through some program of formal or informal education. It would seem to involve a responsible individual who could be trusted in all situations to act according to his interpretation of established codes. This would indicate not only a knowledge of those codes, but also a high degree of personal identification with them.

While it is somewhat trite in this day and age to say so, it must nevertheless be mentioned that there is reason to believe the world will be inherited by those who have the greatest scientific skill. Parenthetically we can state that there is also reason to believe it will not be worth inheriting if we do not possess the right kind of basic morality.

As light on the supply of potential scientific skill, a McGraw-Hill Department of Economics report, dated April 1, 1960, has this to say:

> There will be vast changes in the structure of our labor force during the next ten years—changes for which it would be wise to prepare early. The types of job openings which will be available—predominately professional and technical positions—will call for more highly trained and skilled personnel than ever before. But the available manpower will be concentrated in the youngest age bracket. . . .

It also states that—

> . . . the over-all demand for workers will rise by 25 per cent, but the openings for professional and technical personnel will increase by 41 per cent . . .

Further in the report it mentions that by 1970 there will be an actual decrease of 200,000 workers in the 35-44 year age bracket which supplies a large portion of our skilled workers, managers, and executives.

There are two additional aspects of the short supply problem which have to be taken care of somehow. The rapidity with which science is growing means that engineers have a half-life of probably 10-15 years in terms of their collegiate educations. It is most important that they keep up, that they do not become obsolete. The truly professional engineer will take steps to see that he does not become obsolete. We must establish the motivational forces and the opportunities for these forces to become effective, or we will be faced with having many older engineers who are less useful than young engineers, whereas their experience should be most useful to us if coupled with modern skill. This would already seem to be the case in some measure, as witness the compression factor in salaries, indicating that industry feels the young theoretician may be worth more in our free enterprise society than the experienced old timer who may be thoroughly acquainted with a long established industry but has no

The general manager of an Allis-Chalmers plant in Oxnard, Calif., realizes the engineer's role in community activity as a responsible citizen and coaches a local swimming team (right).

Engineers can be brought up to date on technological advances in many ways. Here, engineers of ten to twelve years standing participate in a television classroom on transistor circuits (below).

knowledge of new ones, such as nuclear power, missiles, or electronics. Should this be true?

The other area that must concern us is the large number of young men who will become managers. How are we going to inculcate in this group, who will be 35-44 years old in 1970, that information and those ideas which are so essential to good management? It would seem necessary to sow the seeds now, even though they may not mature for several years.

Now let me get back to what the ECPD has done with regard to the "First Five Years." This program has six points; they are:

- Career orientation
- Continued education
- Professional identification
- Responsible citizenship
- Selected reading
- Personal appraisal

All these points represent a challenge. They present difficulties to be overcome and questions to be answered—a task for schools, professional societies and industry.

Orientation and training in practice take time, and it takes money which many industries, conscious of the necessity for immediate profits, are slow to undertake. How can better orientation and training be shown to be profitable quickly as well as in the long run?

Continuing education involves night school work which is not attractive to many college professors and is frowned upon by many college administrators due to its non-resident features. It is also difficult for the young married engineer who might have to be out of town quite a bit in connection with his job and highly prizes his few nights at home. What are the incentives in continued education for these people?

Professional identification, particularly the registration requirements, demand effort and time on the part of the young engineer, as does identification with technical societies. In his early life, at least, he is not apt to see the benefits. What are these benefits?

Responsible citizenship is no easy job for anyone. It is particularly difficult for industry to promote without being accused of partisanship, yet it is fundamental and ways must be found to do it. What ways? Who has time for selected reading? Strong motivation is needed here. How do we create this motivation?

Personal appraisal demands a degree of reflection and introspection which few of us possess. Good counselling provided by industry should greatly help a man in identifying those areas where he may have the best chance for success and service. How can a man best understand himself?

There are also isolated neglected areas in the field of engineering education which must be filled. One of these is in the field of economics. In the pamphlet, "After High School, What?" published by the Engineers' Council for Professional Development, the statement is made that from 40-50 per cent of the executives in industry are engineers. These people need economic understanding and it is probable that many corporations will include, in one manner or another, economic courses or economic lectures covering basic principles, particularly as they apply to an individual corporation. In the writer's company we have a course entitled, "Fundamentals in Business" involving eleven half-day sessions conducted on a seminar basis. We give this to all our young engineers and we use as examples many of the

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Report on a Case by the Board of Ethical Review

The Board of Ethical Review was established to provide service to the membership of the NSPE by rendering impartial opinions pertaining to the interpretation of adopted Canons of Ethics and Statements of Policy regarding professional conduct. The *American Engineer* will print findings on specific cases as they are reported by the BER to the NSPE Board of Directors.

Case No. 60-8

Subject:

Competitive Bidding—Reduction of Fee—Section 19, Canons of Ethics; Section 26, Canons of Ethics; Rule 48, Rules of Professional Conduct; Rule 49, Rules of Professional Conduct; Rule 50, (Second Paragraph) Rules of Professional Conduct; Rule 51, Rules of Professional Conduct.

Facts:

A municipality selected three engineering firms for interview on the design of a certain water and sewage plant. Each firm proposed virtually the same fee, based on the recommended fee schedule of the state society of professional engineers. The city officials asked each firm to state a figure of the amount of reduction from the fee which it would grant, based on the fact that the city would furnish the preliminary engineering report, partial estimates during construction, all inspectors and resident engineers and other data of value to the engineers in performing their work.

The three firms discussed the request jointly and agreed on a uniform credit of $10,000 for the data and services to be furnished by the city. The engineering firms considered that an agreement among them was necessary in order to prevent the procedure from being converted from one of negotiation to one of competitive bidding, it appearing that the city would grant the contract to the firm offering the highest credit.

Questions:

1. Would it have constituted competitive bidding for the several engineers to independently offer the city a reduction in the fee?
2. Was it unethical for the firms involved to confer and agree on a standard credit figure to be offered to the city?

References:

Canons of Ethics—Section 19—"The engineer will endeavor to protect the engineering profession collectively and individually from misrepresentation and misunderstanding."

Section 26—"He will not compete with another engineer on the basis of charges for work by underbidding, through reducing his normal fees after having been informed of the charges named by the other."

Rules of Professional Conduct—Rule 48—"The practice of engineering is a learned profession, requiring of its members sound technical training, broad experience, personal ability, honesty and integrity. The selection of engineering services by an evaluation of these qualities should be the basis of comparison rather than competitive bids."

Rule 49—"Competition between engineers for employment on the basis of professional fees or charges is considered unethical practice by all professional engineering groups. Hence, the announced intent of an owner or governmental body to request such competitive bids removes from consideration many engineers who may be the best qualified to be entrusted with the proposed work."

Rule 50—(second paragraph)—"Should the engineer be asked for a proposal to perform engineering services for a specific project, he should set forth in detail the work he proposed to accomplish and an indication of the calendar days required for its accomplishment. The engineer's qualifications may be included if appropriate. A statement of monetary remuneration expected should be avoided if possible. Should such a statement be deemed necessary, the proposed fee shall be equal to or more than the fees recommended as minimum for the particular type of service required, as established by fee schedules or practice in the geographical area where the work is to be done. Where a fee cannot be established in this manner, the ethical fee shall be equal to actual cost plus overhead plus a reasonable profit."

Rule 51—"He will take a professional attitude in negotiations for his services and shall avoid all practices which have a tendency to affect adversely the amount, quality, or disinterested nature of professional services; such as charging inadequate fees for preliminary work or full services, competing for an engineering assignment on price basis, spending large amounts of money in securing business or consenting to furnish monetary guarantees of cost estimates."

Discussion:

Rule 50 contemplates that an engineer may base his suggested fee on the state society schedule of recommended minimum fees, which is presumed known to the general public and city officials. On this basis, where the suggested fee from various firms is substantially identical, the client (city) should select that firm which it feels will provide the most satisfactory professional service. To this point there is no violation of the rule against competitive bidding.

When the city declined to follow this procedure and requested fee reductions from *all* the firms the procedure became one of com-

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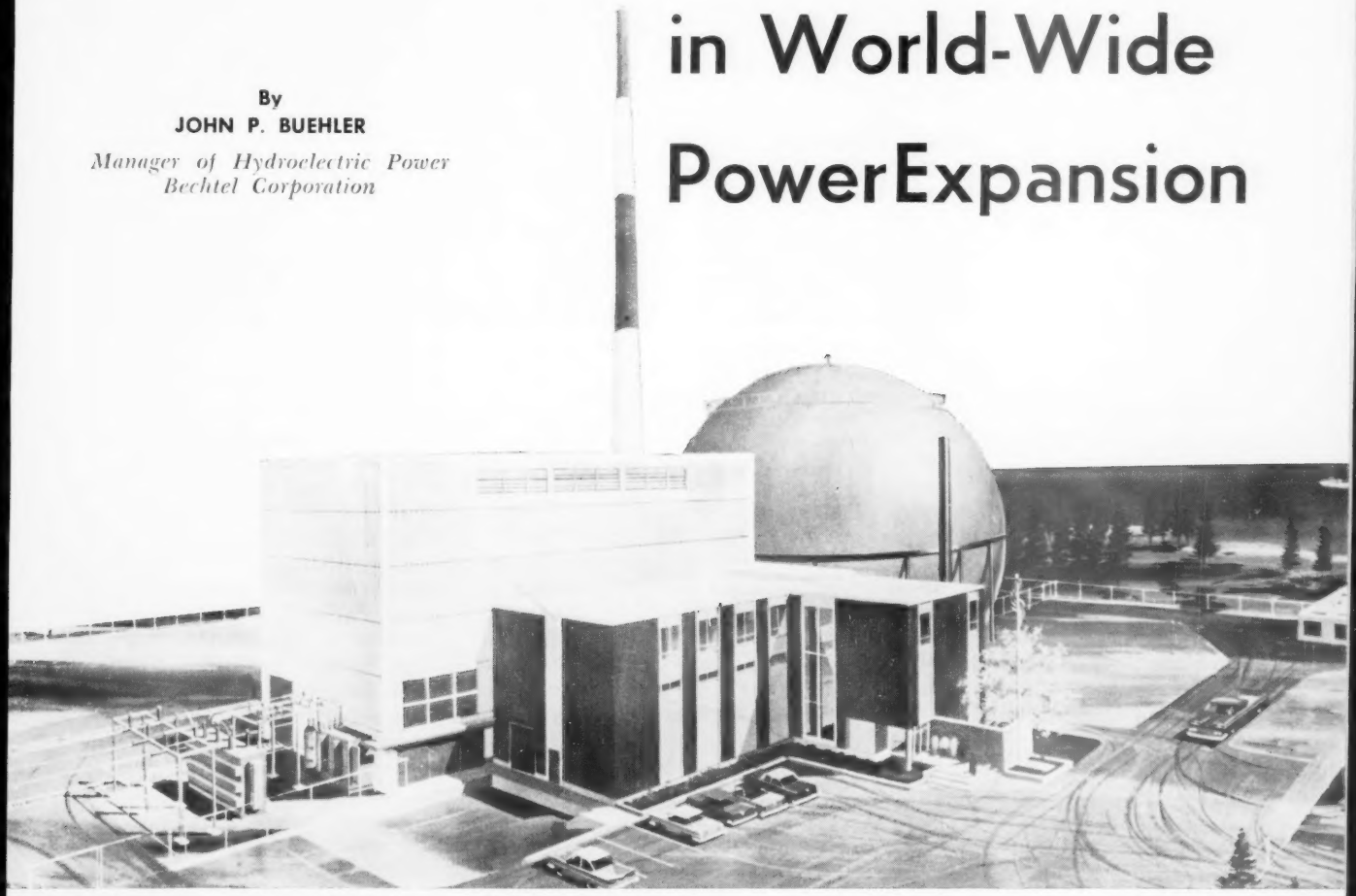
An Engineer-Constructor's Role in World-Wide PowerExpansion

By
JOHN P. BUEHLER
Manager of Hydroelectric Power
Bechtel Corporation



Major nuclear power plants such as the Big Rock Point station of Consumer's Power Co. near Charlevoix, Michigan, are advancing technology in this field and bringing the day nearer when nuclear fueled plants are competitive with conventional steam plants.

THE increasing use of energy to provide heat, light and power has been an important factor in the development of civilization, and the consumption of energy in the world during the last hundred years has been parallel with material progress. Just as the industrial revolution is considered the most important developmental factor in the last century, so the burgeoning demand for energy may be so considered in the Twentieth Century.

The fact that North America has led the world for many years in energy consumption is attributable to its very high level of mechanization. Its consumption will increase in the future, but will be over shadowed by the tremendous increases which are expected in other parts of the world as they "catch up" in the mechanical age.

World power consumption for next year is estimated at two billion megawatts; by 1970 this figure will have increased to four billion and by 1975 to five billion. Within the next five years Europe (including Russia) is expected to exceed North America in total power consumption, and to be demanding almost half again as much as North America by 1975.

Proportionately, other parts of the world will have experienced even greater growth. Forecasters predict that Asia will triple her consumption, and that South America will quadruple hers.

Naturally, as a business man, the U. S. engineer-constructor is not going to ignore the opportunity to participate in such an attractive market. However, he must ask himself "What do I have to offer? Which of my talents and services do other countries want to utilize?

How can these talents and services be effectively provided?"

"What do I have to offer?" is easily answered, for the American business man is constantly analyzing and evaluating his capabilities. Knowing what is wanted requires some study. In order to determine what talents and services are needed abroad one must look at the use to which they have been put in the past and do some "crystal balling" as to where and how they will be used in the future. On this basis it appears that the over-all role of the U. S. engineer-constructor in the world power expansion will be that of a contributor to power progress. His contributions will be made by furnishing the needed knowledge and skills to the degree required by each country and then by passing these skills and knowledge on through precept, training and example.

The application of the engineer-constructor's services to any country will be affected greatly by the stage of industrial development that country has reached. Generally, countries can be grouped in the following way regarding power consumption: (1) Highly developed countries—of which the United States and England are representative; (2) countries of intermediate development—as represented by Australia, Italy, Brazil and including Japan and Russia, which, although highly industrialized in certain areas, still cannot be called highly developed from an over-all standpoint; and (3) newly developed countries as represented by India, Saudi Arabia, and Venezuela.

Such a classification does not consider population distribution. It is well to bear in mind that nearly two-thirds of the peoples of the world live in the newly developing countries, with the other third about evenly distributed between the highly developed and the intermediate.

On the basis of these three categories, the U. S. engineer-constructor may explore the extent to which his specialized knowledge of hydroelectric, fossil-fueled and nuclear power may be needed.

CERTAIN areas exist where it seems unlikely that the services of the U. S. engineer-constructor would be sought. These areas are not to be "written off," but on the basis of present knowledge, they do not appear to be logical power prospects for U. S. contractors in certain of the power development fields.

Pipelines crisscrossing Europe are transporting oil to produce power for major industrial centers. One of these is the Rotterdam-Rhine Pipeline shown under construction near Cologne, Germany.

For example, the Scandinavians, Swiss and French are well versed in the hydroelectric field. The English, French and Germans have been building and operating fossil-fueled steam power plants as long or longer than Americans. In short, the highly developed countries and some of the intermediate presently are capable of designing, engineering and constructing hydroelectric and fossil-fueled power stations.

In the nuclear field opportunities seem more favorable. By 1975 nuclear stations may be well on their way to supplying the major increase in electric power generation requirements if things go well in the development of economical nuclear power. At present it is probable that most of the engineering and construction knowledge of nuclear installations is centered in the United States. Very important work has been done by the British at Calder Hall and the French at Marcoule, and perhaps by the Russians at Obninsk and in Siberia. Each year brings new projects in other countries. Nevertheless, to date more atomic work has been done in the United States, and particularly more commercial application, than elsewhere in the world.

Harnessing the atom for power is not limited to application by the highly developed countries. It appears to offer promise of fulfilling the power needs of intermediate and newly developing countries, too.

Conditions which determine the use of nuclear power will vary in the different areas of the world. In Europe, serious consideration of nuclear power will be made by countries which: (a) Either have little hydroelectric potential or are presently operating at full economic hydroelectric capacity; (b) currently derive power primarily from fossil-fueled thermal stations but either are without coal, petroleum or gas resources within their own country, or find the cost of recovering such resources excessively high: and (c) have per capita energy consumption comparable to other European countries which have ample energy supplies. The countries with high consumption levels and small energy resources will be the first to feel the effect of increasing demand.

Pilgrims to Mecca for hundreds of years were brought to shore at Jiddah by small boat. Today, ships dock at a new, modern pier provided by the Saudi Arab government from oil royalties.

Tact and understanding sometimes require blending the old and the new—as when concrete mix is carried to the forms in a bowl on top of the head. Training in new skills plays a major role in successful operations overseas.

European countries where some or all of these conditions exist and are therefore good prospects for nuclear power include Denmark, Switzerland, Spain, Italy and to a lesser extent, perhaps, France and Germany.

In the newly developing countries other conditions appear to make the use of nuclear power promising. Where fossil fuels must be imported, or transported for long distances over land, and where power costs are already high, small nuclear power plants might be advantageous. The fuel for these plants is relatively light in weight and needs replenishing at infrequent intervals.

An additional consideration is the cost of transporting the electrical energy itself, the construction of transmission lines. In many countries where the terrain is rugged and the population centers are widely dispersed, this is a factor of considerable importance.

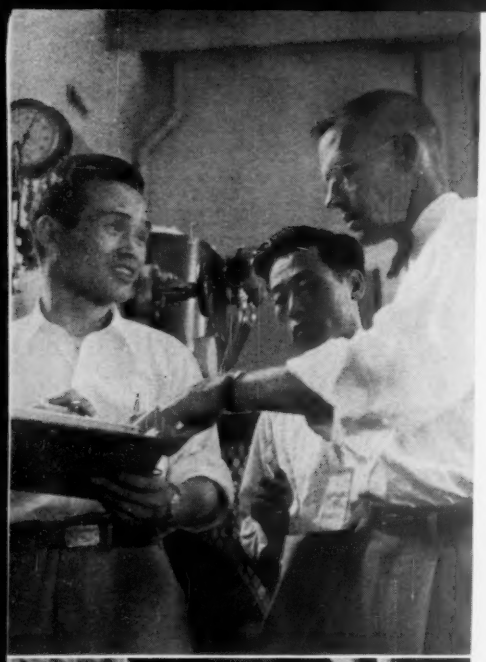
Areas where these conditions exist include much of South America, Central and East Africa, India and Asia.

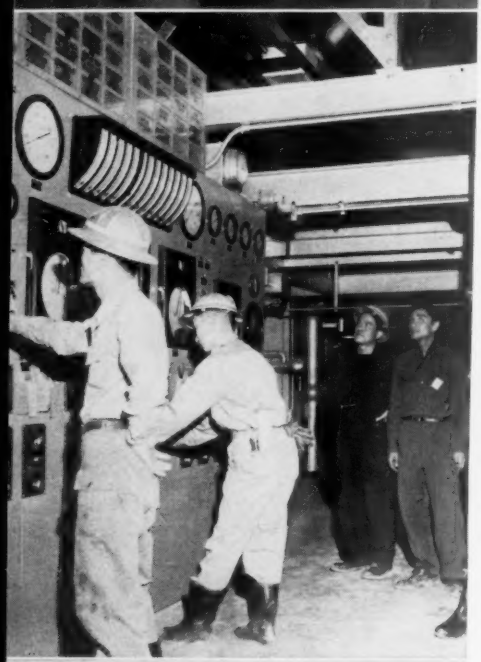
In countries of intermediate development hydroelectric and fossil-fueled power plants will be needed to meet the rising demand for power. How much assistance the U. S. engineer-constructor can give to these countries will depend largely upon the technical capabilities within the country itself. Nations which appear to have promising potential are Portugal, with large, undeveloped water resources; Turkey, with coal and petroleum deposits which may be exploited for power use; and many of the South American countries having both hydro and fossil resources which have only begun to be utilized.

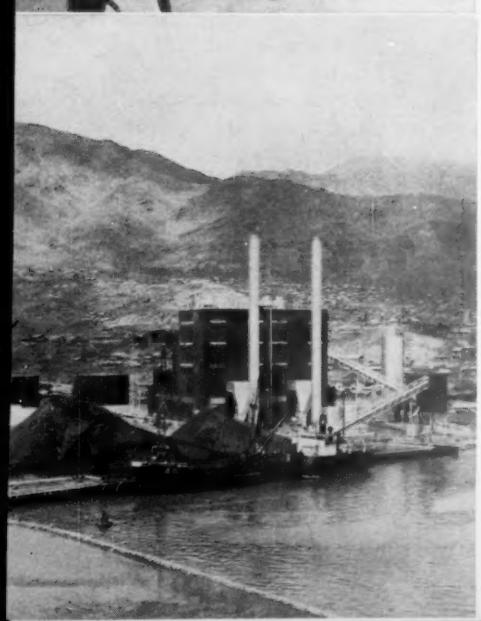
SKILLED engineers and constructors are available in many of the intermediate countries. However, most of these firms are limited in the size of a project they can undertake. Power installations comparable to the Hoover, Glen Canyon, Trinity and Swift dams in the United States or the Aswan and Bhakra dams abroad require an organization which is accustomed to large figure logistics, accumulating quantities of equipment and supplies, recruiting, supervising and maintaining many employees. In such instances, the services of an engineer-constructor from outside the country are generally required—frequently those of American firms where the selection is limited to the larger companies, particularly those with overseas project experience.

In countries of intermediate development the services of an outside engineer-constructor are being used more extensively in the field of engineering management. The factors of nationalism and an increasing number of qualified local contractors bring heavy pressures to bear limiting the extent of the outside engineer - constructor's work. Nonetheless, the technical capabilities of the local firms are usually not great enough to perform the entire task. As the engineer-manager a U. S. firm would ordinarily design the installation, then supervise and coordinate the work of local subcontractors in the construction phase.

Part of the contribution U. S. firms make to the intermediate countries, beyond specialized engineering and construction knowledge, is assistance in establishing working procedures which help to bring about more favorable conditions for construction and, indirectly, for investment. One of the hallmarks of American business has been its organizing ability with emphasis placed upon efficiency. The entrepreneurs of many countries do not think in terms of schedule, cost control, and standard procedures for engineering, purchasing and administration. By association with the American engineer-constructor, they are introduced to this type of thinking, and often subse-







Stateside instruction for Korean engineers included work at the University of California (top). They, in turn, passed this knowledge on (center) to their compatriot workers at Korea's new steam power plant at Masan (bottom).

quently attempt it in their own business life.

Newly developing countries must turn to the outside engineer-constructor for technical experience. Otherwise, at the outset, development may proceed slowly as a result of errors due to inexperience and delays and inefficiencies resulting from untrained or partially trained men.

In newly developing countries there is a tremendous effort to "catch up." Yet how to accomplish this is a task many of the governments find themselves ill equipped to perform. They are handicapped by social and economic obstacles, limited capital resources, and untrained manpower—but national pride often balks at asking for technical aid from more fortunate nations.

Besides finding the best combinations of resources and factors of production, the development process depends upon calling forth and enlisting resources and abilities that are hidden, scattered or badly utilized. Training is inherent in such a concept. This is an area in which many American companies have had extensive experience abroad.

Power generation is not limited to public utilities, of course. Many of the major overseas projects have required their own power stations. Such was the case with the Arabian American Oil Company's Ras Tanura Refinery.

This was one of the earliest of Bechtel overseas projects. Training began at the very bottom of the labor scale. Among the workers were Arabs who had never seen a wheelbarrow before. The process of training and job instruction was slow, but through experience and analysis a basic pattern of instruction evolved.

From this beginning on-the-job training programs have been organized and conducted in many different countries. From these programs nationals of the various lands have learned to operate and maintain construction equipment, to use modern tools, to weld tanks and pipelines, to become mechanics, electricians, carpenters, surveyors and office assistants, and to operate and maintain the finished project with a high degree of efficiency.

Not only have American technicians trained their native counterparts directly, but they have taught many of the nationals to pass on their newly acquired knowledge to others, to organize crews, and to perform parts of the work on subcontract. In fact, it is part of most companies overseas employment agreement with U. S. citizens that they will "lead, instruct, direct and work with local labor."

The U. S. engineer-constructor, from the point of view of enlightened self-interest and in the pursuit of normal profitable operations, consciously follows policies of good citizenship in foreign countries. Part of this good citizenship is to try to guide his overseas client along a path which will eventually lead to the greatest rewards for the country, even when it may conflict with preconceived ideas the country may have.

A country that sets out on the road to development often does not realize the difficulties of the task ahead. When it becomes clear that development extracts a high price in terms of human suffering, social tensions and the forced abandonment of traditional behavior and values, the desire for development may lessen, bringing with it harmful economic tendencies which tend to slow down development, or eventually to halt it. If, on the other hand, the benefits of development are felt through an increase in individual income, this factor will outweigh the discomforts that may accompany it. In fact, it has been said that any policy which does not have as its objective the raising of living standards cannot satisfy the needs of undeveloped countries.

Development requires the undertaking of a series of projects producing favorable effects on the flow

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Rhode Island Firm Puts An End to the Problem of Free Engineering Services

How many engineering man-hours, how many dollars, how much irreplaceable time is being thrown down the drain through the practice of so-called "free" engineering?

The answer: Too much, as surely as there are any of the foregoing being wasted at all. The obvious conclusion: "Free" engineering simply doesn't exist. The problem is one that has been harrassing the engineering profession for many years. The horns of the dilemma are these—on one hand, providing "free" engineering services is clearly a waste of time, manpower and money if it doesn't produce concrete results. On the other hand, to dispense with the practice could conceivably alienate old customers and frighten away prospective clients.

The solution, to bend a proverb, is to take the dilemma by the horns. This, at least, is the answer found by one firm, the Brown and Sharpe Manufacturing Co. of Providence, R. I. Dismayed with "inquiries being sent to us when there is no intention of following our recommendations," Brown and Sharpe let its customers know as of December 1, last year, that all requests for engineering proposals submitted for screw machine tooling to them should be accompanied with a purchase order for $15.

The reason for the change was clearly stated by Brown and Sharpe: "It is not intended that the nominal charge of $15 will cover actual engineering costs, but we believe the benefit to our valued customers and to Brown and Sharpe will be the elimination of some nonproductive engineering work which has prevented us from devoting more of our time to inquiries which should be processed more promptly."

The aim is obviously not to make money. The $15 charge is more in the nature of a pledge of good faith asked of the prospective customer. For if an order actually results from the engineering proposal, the fee is credited to the eventual total bill. Thus, Brown and Sharpe point out, "In the future, *bona fide* inquiries will cost the customer no more than in the past, since a credit will be issued against the engineering charge when an order is placed. . . . If an order is placed for a machine or attachment, as a result of a tooling quotation, but does not include the actual tools, a refund will be made for the engineering charge."

The final measure of any system of this sort must be whether or not it works. George A. Hawkins, sales director of Brown and Sharpe's Machine Tool Division told the AMERICAN ENGINEER this: "Since the announcement of this plan we have found a very large reduction in the number of requests received for engineering proposals. However, the requests which we are now receiving are of excellent quality, and, in most cases, the customer has accepted our proposal and placed an order for the equipment. The percentage of acceptances to proposals submitted is now very much higher than it was before the plan was announced."

From the company's point of view, and for the customer as well, the program is doing exactly what it should. Wasted engineering time is cut, and as a result each hour spent on engineering produces more in the way of actual dollar return. The premise stated in the original announcement of the plan seems to have been fulfilled: "We believe this practice will discourage inquiries being sent to us when there is no intention of following our recommendations, as has happened in the past."

Does such a move on the part of a company in a highly competitive area of operations jeopardize its position in the business? This certainly is a logical and crucial question. At least one answer is available in an unsolicited letter received from Walter E. Ahlberg, president and sales manager of Camden Copper Works, Inc. The letter provides an intelligent and succinct statement of the "free" engineering problem, and in all likelihood sums up and represents the feeling of many people who have had to contend with it.

"We of Camden Copper Works, which has long suffered under a burden of time consuming, wasteful and demoralizing nonproductive inquiries, would like to express our hearty congratulations on your excellent letter dealing with this situation. Firm action in dealing with the insidious practice of soliciting free information with little regard toward good will is long overdue.

"Camden Copper Works has endeavored to educate our customers to the fact that our overhead, a great deal of which is devoted to engineering and other services, is directly reflected in the ultimate cost of their equipment. This approach, however, has met with very limited success.

"Again, our sincere best wishes for the success of this program as an example to industry of a long sought after method of dealing with this most wasteful practice."

If not everyone has responded with such wholehearted enthusiasm to the idea, it has nonetheless been fairly well received. Comments

(Continued on page 58)

New Literature

ENGINE STARTING—A new Automatic Engine Starting Control intended for fully automatic starting and stopping of engine driven generating sets has been marketed by the Automatic Switch Company (ASCO). Described in their new publication 653, the new equipment is said to have the following principal features: Positively prevents recranking at full engine speed; designed to respond at 50 per cent of normal battery voltage; operates over broad ambient temperature range; repeated or continuous cranking cycles provided by same panel; industrial control type components throughout; and operates from a single pole contact on the automatic transfer switch or control station.

(Circle 15 in Readers' Service Dept.)

VALVES—A new edition of Catalog 10-B on R-P&C Valves was recently published by R-P&C Valve Division, American Chain & Cable Company, Inc. This 16-page 8½ x 11" catalog shows illustrations with condensed descriptions and specifications on R-P&C bronze, iron body and cast steel gate, globe and angle, and check valves, bar stock valves, and forged steel gate valves.

(Circle 16 in Readers' Service Dept.)

STEEL FORMS—A completely standardized, interchangeable system of steel forms for street paving is described and illustrated in a new brochure available from Blaw-Knox Company. The 12-page booklet highlights curb and gutter, flexible radius, straight curb, battered curb and sidewalk forms, as well as details and accessories. Data is also given on how to set up, strip and maintain steel forms. Some of the main features include fingertip connectors and rigid lock joint connection.

(Circle 17 in Readers' Service Dept.)

WELLPOINT SYSTEM—The Moretrench Corporation recently published a 61-page, 2-color booklet describing

their wellpoint system for dewatering, stabilizing and preventing mass movement of wet soil during excavation. Fully illustrating example cases of each phase in the operation, the booklet describes steps taken in typical cases as well as some of the more difficult cases. Among the advantages listed for using this system are: Changes wet ground into dry firm soil; increases production per day; may partly or wholly eliminate sheeting and shoring; eliminates collateral "wet costs;" provides water usable for construction purposes, sometimes even for drinking; minimizes clogging; speedy assembly; experienced field and engineering services; and systems available for rental which need not be purchased.

(Circle 18 in Readers' Service Dept.)

PLASTICS—Union Carbide Plastics Company has recently issued a 1961 Materials and Data Guide describing the following Bakelite brand plastics: Polyethylene, epoxy, phenolic, styrene, vinyl. The various uses of these plastics described are: Bonding and laminating; packaging; molding; extrusion; coating; film and sheeting. Under each use listed a general description of the methods used and the advantageous properties of plastics are given, as well as specifications and illustrations of present uses.

(Circle 19 in Readers' Service Dept.)

TRUSS SIGN SPANS—The Pfaff and Kendall Company has published a new four-color brochure describing the advantages of using aluminum box truss sign spans on highways. Illustrated with pictures of highways presently using this type of product, the brochure gives the background, specifications, engineering data on the spans, as well as examples of walkways, illumination, and sign hangers presently in use. Specifications section includes complete descriptions of construction, design, testing, welding, hardware, anchorage, and quality control. Spans designed to carry from 100 to 600 square feet of signs are described for easy reference in chart form.

(Circle 20 in Readers' Service Dept.)

GRATING—Kerrigan Iron Works Company has recently published two booklets describing their complete line of aluminum and welded steel gratings. A number of the features of the welded steel gratings which are listed in the book are: Electronic welding; extra safety features such as twisted cross bars, bearing bars finished to customer's specifications; and uninterrupted spiral bars. Some of the engineering data given includes bearing bar size and M.G.I. mark, approximate weight in lbs. per sq. in., and length of span. Other charts are listed as an aid to choosing the proper type of grating, as well as illustrations of gratings in use. A number of the advantages listed in the use of aluminum gratings are: Permanently locked bars, rattle proof panels, higher strength-to-weight ratio, less deflection, spark-proof and corrosion resistant.

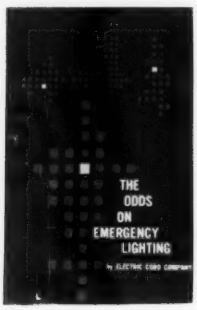
(Circle 21 in Readers' Service Dept.)

WM UNITS—Recold Corporation announces a catalogue for a new series of multizone heating and ventilating units. The WMH (horizontal) and WMV (vertical) units are designed especially for schools, institutions, industrial and commercial buildings and similar applications. Compact, modu-

lar design permits flexibility of motor and coil location. The units combine efficient zone control with economy of installation and operation. The brochure outlines nominal rating data, dimensions, arrangements and specifications of both units.

(Circle 22 in Readers' Service Dept.)

EMERGENCY LIGHTING—A new 12-page booklet offered by Electric Cord Company shows what happens in



a power failure "blackout," and how the risks can be avoided by property owners. "The Odds On Emergency Lighting" covers the probability and costs involved in power failure, as well as information and specifications on Light Warden battery-operated emergency lighting. Typical installation diagrams and approximate costs are included.

(Circle 23 in Readers' Service Dept.)

PRODUCTIVITY GUIDE—In an effort to aid industry to achieve higher profits through more efficient production, Yale Materials Handling Division of The Yale & Towne Manufacturing Company has developed a "Management Guide to Productivity" that permits management to expose unwarranted handling expense and provide cost reduction opportunities through corrective materials handling measures. The material in the book was compiled and simplified by Yale & Towne engineers and Professor James R. Bright, Harvard Graduate School of Business Administration, from analytical procedures developed and used by the professor in the training of materials handling specialists, at the Industrial Management Center at Lake Placid, New York. Material contained in the volume, basically seven efficiency cost ratios, organizes the cumulative knowledge of many years of materials handling experience into a simple, easily applicable "package" that can be effectively utilized by management in their quest for higher profits through greater efficiency. The measurement ratios are presented in a form that will enable the average manager or engineer to recognize any operation in plant or yard burdened with unwarranted handling costs.

(Circle 24 in Readers' Service Dept.)

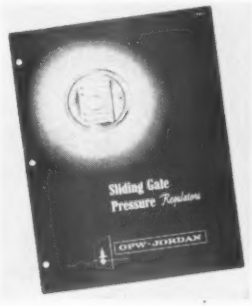
MOTOR CONTROL—Arrow Hart & Hegeman Electric Co. has just published an easy-to-use Motor Control Quick Selector which includes information about the following types of starters: Push button stations, single phase magnetic starters, single phase manual starters, magnetic reversing starters, combination starters, polyphase magnetic starters, polyphase manual starters, as well as tables on the standard heaters. The two-color, 20-page booklet will fit into standard files or three ring binders. Specifications, features, sizes, horse-power, are given for each type of unit in simplified chart form for easy ordering.

(Circle 25 in Readers' Service Dept.)

PIPE AND FITTINGS—A new 20-page catalog issued by Pacific Foundry and Metallurgy Co. describes in detail the company's expanded line of "Corrosiron" high silicon iron drain pipe and fittings. The catalog itemizes, with dimensions and prices, over 300 Corrosiron items, in 58 different configurations, all illustrated. Other features of the catalog are a listing of the company's more than 50 sales offices, and a table which provides a comparative analysis of the corrosive action of various industrial chemicals which are difficult to handle with conventional piping materials but which have little or no corrosive effect on high silicon iron drainlines.

(Circle 26 in Readers' Service Dept.)

PRESSURE REGULATORS — The OPW-Jordan Company has published a new bulletin describing the sliding



gate pressure regulators. The eight-page brochure lists each regulator separately giving cut-away illustrations, various features, materials of construction, dimensions and weights, applications, names of parts, and methods of operation. Pilot operated pressure regulators and back pressure regulators are listed with an easy to read sizing chart for valve capacities as an additional aid.

(Circle 27 in Readers' Service Dept.)

ELECTRIC HEATERS—A deluxe plastic bound catalog describing 300 models of built-in and portable electric heaters has just been prepared for architects, engineers, and electrical contractors by Markel Electric Products, Inc. A built-in electric heater for almost every conceivable application can be found in the new 30-page Markel catalog. Dimensions and specifications are given for built-in electric heaters designed to cope with the entire range of residential, commercial, industrial, institutional and farm heating problems. The Markel units run from a low capacity of 500 watts to a high heavy duty capacity of 10,000 watts. The new Markel Electric catalog contains full descriptions of all Markel built-in electric heating equipment, including: Fan-Glo Heetaires, Thrift Trim Baseboard Heetaires, Baseboard Heating Systems, Radiant Heetaires, Fan-Forced Heetaires, Heavy-Duty Electric Unit Heaters and Ceiling Heetaires.

(Circle 28 in Readers' Service Dept.)

These listings are informational only and are not an endorsement of the products, nor of the manufacturer's claims. To receive any of the new literature described in these columns, merely circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

Full Schedule at Seattle Keeps Delegates Active

A wide range of topics touching on many areas of broad significance made up the agenda of the 1961 NSPE Annual Meeting, held July 4-7 at the Olympic Hotel in Seattle, Washington.

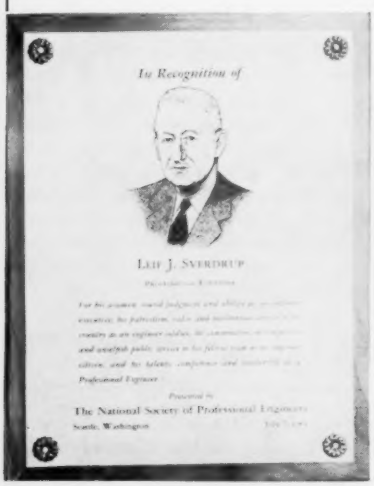
During the four-day meeting, the NSPE Board of Directors dealt with subjects including just about everything from the President's Peace Corps to the basic foundation of NSPE membership itself. New officers, new statements of policy and new plans for the future of the Society were the results of the highly successful and profitable meeting.

From a Society viewpoint, probably the most significant action of the meeting was what may well be the first step towards opening Society membership to qualified, but nonregistered, engineers (see "Toward a More United Profession," June AE). The Board provided: (1) That each national director would study the plan, discuss it with as many officers and members of his state society as possible, and advise the Inter-Society Relations Committee chairman of any suggestions or comments relative to the plan; also, (2) that the Constitution and Bylaws Committee be requested to submit to the 1961 Fall Meeting of the Board the constitutional and bylaw changes required to extend NSPE membership to qualified but nonregistered engineers.

In another Board action following considerable discussion, recommendations regarding the size of the Board of Directors made by the Organization and Functions Committee were also adopted. The four-part recommendation included the following points: (1) That the maximum number of national directors from any one member state society who shall be reimbursed by the National Society for attending a given Board meeting shall be limited to four. Each member state society shall be fully entitled to send additional directors who have been duly elected or appointed in accord with proper procedure, but such additional directors shall not receive an expense allowance from the National Society; (2) that the present apportionment of votes remain unchanged; (3) that the expense formula as set forth in Bylaw 2 be continued in effect; and (4) that the matter of consideration for limiting the size of the Board of Directors of the Society be reviewed by a successor committee at approximately five year intervals or as otherwise deemed necessary in keeping with changing trends and the best interests of NSPE.

Featured Individuals

The 1961 NSPE Award shown below was presented to Leif J. Sverdrup, P.E., of St. Louis, Mo., for his outstanding service to the community and the profession.



NSPE President Murray A. Wilson accepts the gavel of authority from outgoing President Noah Hull at the annual banquet, held in the Grand Ballroom of the Olympic Hotel. The new president took office in ceremonies installing all of NSPE's officers.

In action on another recommendation by the Organization and Functions Committee, the Board decided not to act on a move to create a National level office of president-elect.

In another organizational change, the recommendation of the Engineers in Industry Committee was followed which sets up a Functional Section for Engineers in Industry, paralleling those already in existence for engineers in private practice and government. Aim of the change was to "further the Society's goal of promoting progressive professional relations between engineers and industrial management."

Besides those items pertaining directly to the Society and its position in the engineering profession, the Board of Directors heard first full reports of new committees on The Merging Role of Science and Engineering and on Federal Engineering and Scientific Activities, chaired respectively by Past Presidents Clark Dunn, P.E. and Harold Mosher, P.E.

Although it had previously submitted a preliminary report on its studies and conclusions, the Committee on the Merging Role of Science and Engineering this time offered the Board three concrete recommendations, which were approved as follows: (1) That the Registration Committee explore the need for improvement in the understanding of registration requirements among interested non-engineering groups; (2) that the Board approve tentative definitions of engineers and scientists, which are: (a) engineers are primarily creators of things and services useful to man and (b) scientists are primarily discoverers and interpreters of information about nature; and (3) that the NSPE Board endorses detailed consideration of the proposal for the establishment of an Engineering Advisory Panel, and that the president be asked to assign, to such committee or committees as he deems logical, the responsibility for the preparation of a detailed report.

In presenting the second recommendation, dealing with a defini-

Glad and Not So Glad

Low ranking membership states were given miniature skunks by membership chairman Harvey Pierce. States represented are Pennsylvania, Ohio, Georgia, Montana, Minnesota, Oregon and Arkansas. The skunks will be redistributed at the Fall Meeting.

Happier, judging by the size of their smiles, were membership winners at Seattle. Above, a pleased New Mexico delegation, and below, a happy District of Columbia Director, Max Morris, (r) receives award from Harvey Pierce. Other winners were Idaho, Mississippi, and Illinois.

Award Winners

Outgoing President Noah Hull presents one of the two joint Industrial Professional Development Awards to H. A. Strickland, Jr., vice president and general manager of General Electric's Instrument Department. The Transformer Division of GE was the joint recipient.

First Beta student chapter of the National Society of Professional Engineers received its charter at the Seattle meeting. Accepting the certificate from Outgoing President Hull is Father Cebula, on the faculty at St. Martin's College in Olympia, Wash.

tion of engineers and scientists, Past President Dunn told the board that the definitions were designed with brevity and simplicity in mind, as well as accuracy. He acknowledged that the definitions might not be acceptable to all, but that since the need was for public understanding, his committee had felt the simpler definition would be best. Dr. Dunn also recommended that the definitions be discussed with other engineering and scientific societies so that a profession-wide acceptable definition could be established.

Dr. Dunn envisioned the Engineering Advisory Panel as being a vehicle for providing "unbiased engineering advice (for) members of Congress and personnel employed by the Federal Government." The proposal specifically shied away from creation of a body that would be "potentially subject to political pressure and influence," such as might be the case if the Panel were set up with Federal funds. The job of the panel would be "entirely advisory." "If a request for advice should require the collection of information or the analysis of alternatives or preliminary studies, the agency seeking the advice should be asked to acquire the necessary information for the Panel's consideration."

The first report of the Committee on Federal Engineering and Scientific Activities covered nine broad areas of subject matter. These were: (1) Creation of a cabinet level department of engineering and science; (2) a cabinet level department of urban affairs; (3) urban mass transportation assistance; (4) a department of transportation; (5) the President's Peace Corps; (6) a council of resources and conservation advisers; (7) a department of public works; (8) promotion of engineering research; and (9) modified depreciation rules on capital equipment.

The board voted overwhelmingly against creation of a department of science, and likewise endorsed other recommendations of the committee as they appeared in the "white paper" on Organization of Engineering and Scientific Activities in the Federal Government. In the other eight areas of the report, the Board also endorsed the recommendations set forth by Past President Mosher's committee.

Other Board actions during the four-day meeting covered a wide range of subjects, including determinations by the Board of Ethical Review. Three of these cases will be published in future issues of the AMERICAN ENGINEER, and one other was referred back to the Ethical Practices Committee for further study. The one referred for additional study had to do with contingent fee contracts. Those endorsed covered competitive bidding, use of P.E. seal on a political advertisement, and association with nonregistered engineers.

A recurrent theme during the four-day Annual Meeting was that of inter-society harmony. The conference was attended by representatives of the Canadian Council of Professional Engineers, the American Institute of Industrial Engineers, and the American Institute of Mining and Metallurgical Engineers. The Canadian organization was represented by its president, L. W. Wardrop, and its executive secretary, Leo Nadeau. J. F. Jericho, president of AIIE, represented his society.

The NSPE Board also endorsed the following resolution initiated by the American Society for Engineering Education: "The Engineering College Research Council of the American Society for Engineering Education has noted the following trends which have accelerated over the past decade: (1) The great increase in engineering college research . . .; (2) the increased interrelationship of engi-

neering research with other areas of research, in addition to those of the physical sciences; (3) the sharp increase in requests for support of basic research from the National Science Foundation and other agencies, and; (4) the unprecedented expansion of graduate studies in all fields of engineering. In view of the above factors, we firmly believe that the time is now here when it has become not only appropriate but necessary in the interest of effective future development, for the National Science Foundation to establish a separate division for engineering science."

Social high points of the Seattle meeting included the annual banquet, a boat trip and salmon bake, and regional luncheons held in connection with highly successful regional meetings during the meeting. Regional meetings covered such subjects as membership, chapter activities, scholarships and state boards of industrial consultants.

Winners, Losers Are Cited in Membership Competition

The all-important subject of membership played a major part in the four-day Annual Meeting of NSPE in Seattle last month. Quarterly winners, quarterly losers, and leaders for the year were all cited during professional meetings held at the Olympic Hotel.

Winning plaques for their outstanding performance over the year were: Group I—Idaho; Group II—Mississippi; Group III—New Mexico; Group IV—Alabama; Group V—District of Columbia; and Group VI—Illinois. Besides the plaques that these states will retain, the same states received membership banners for display during the Seattle meeting.

At the other end of the membership scale, miniature skunks were awarded to those states which had the lowest membership performance since the Winter Meeting. Pennsylvania, Ohio, Georgia, Montana, Minnesota, Oregon and Arkansas received skunks. They will retain them until their position has improved. Re-distribution will take place at the Fall Meeting of the Board of Directors in Roanoke, Va.

Thoughts on Professionalism...

By PAUL H. ROBBINS, P.E.
NSPE Executive Director

Ethics and Enforcement

LATE in June at the annual meeting of the American Medical Association, the president of that organization made headlines in the Nation's press by pointing out certain unethical practices of a small minority of the medical profession. He called upon members of the profession to police their own ranks. He indicated that the medical profession was not seeking or desiring any outside help in this policing, but warned members of the profession that unless they were diligent in cleaning their own house such outside policing might well result.

LESS than a month later, and three thousand miles away, the president of NSPE at its annual meeting warned members of the engineering profession that it, too, had some housecleaning to do. Unfortunately, in the engineering profession there are too many members who feel that the job of policing ethics and assuring the public of competent engineering work is the job of either the registration boards or other members of the profession. Too often members of state societies and local chapters tend to confuse the enforcement of the registration laws with the policing of ethics.

WHILE it is true in many cases both ethical enforcement within the Society and policing through enforcement of the registration law can be used to discipline those who are engaged in shady practices, in many cases they are two entirely separate considerations. It must always be recalled that the registration laws primarily enable the disciplining of members of the profession for malpractice or incompetence, but only in the most serious infractions of ethical procedures can the registration law be an enforcement vehicle. It must also be remembered that violations of the registration laws are enforced under criminal provisions included in the law, and are primarily effective after the act has been accomplished rather than in preventing it. On the other hand, ethical procedures permit a more restrictive policing and enable the disciplining of a member for less serious offenses.

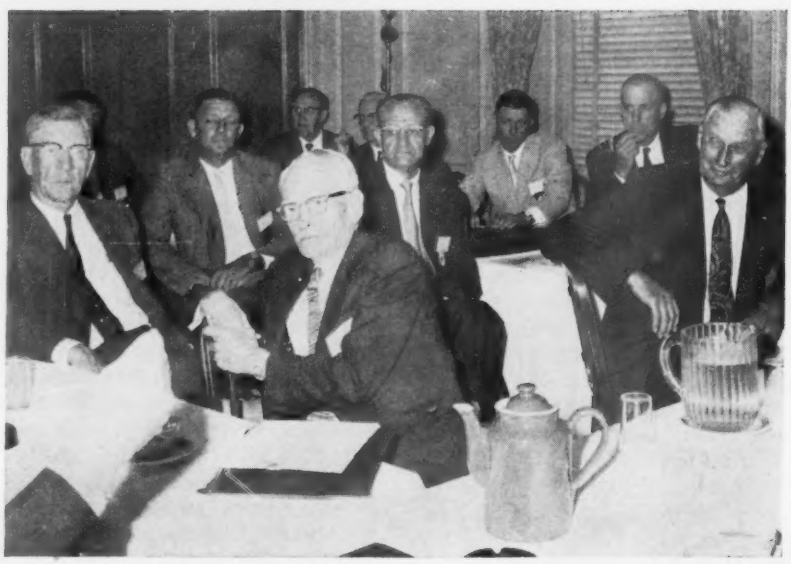
FOR the most part, the policing of ethics and the policing of the registration law involve two different sets of people. The majority of enforcement cases in registration matters involve the unqualified and nonmembers of the profession. This group, for the most part, is outside the realm of discipline under society or professional ethics. Ethical discipline, however, can be enforced primarily against society members, for it is the societies, for the most part, who enact codes of ethics and exert influences to compel adherence to them.

THUS it is that not only the state societies and local chapters of NSPE, but all societies of the engineering profession should exert increasing efforts toward effective enforcement of ethical principles. The few members of the engineering profession involved in questionable practices which are causing current newspaper headlines, particularly those pertaining to the highway program, are casting a cloud over the entire profession. It is most important that societies at all levels of activity, and individual members of those societies, step forward and take aggressive action to discipline those who have flaunted the ethical considerations of the profession.

Professional Problems, Regional Meetings, Skunks, All Played A Part

Smallest star attraction at the Seattle meeting (right) combined efforts with the Membership committee to remind states with low membership rankings to improve in the future.

Professional problems received a thorough airing at the Seattle meeting. At left, a representative of Boeing Airplane Co. speaks to a group of engineers in industry. Seated are R. G. Hoft, P.E., of General Electric, and W. L. Crowder, P.E., of Western Electric.



Regional meetings and regional luncheons highlighted the July 5 meetings at the Hotel Olympic. The Central regional meeting, shown at right, discussed matters including membership, chapter activities and scholarships, as did other regions.

1961-62 Officers Installed at Banquet

NSPE's new officers for the year 1961-62 were installed at the Seattle Annual Meeting on July 7, as the culmination of a banquet held in the Grand Ballroom of the Olympic Hotel.

President of the Society for the coming year, Murray A. Wilson, P. E., of Salina, Kansas, accepted the gavel of his office from outgoing President Noah Hull, P. E., and pledged his efforts to the continued growth of NSPE.

Other officers installed were Treasurer Russell B. Allen and Vice Presidents John Stufflebean, Thomas A. Mann, Earl Christian, Harvey Pierce, Waldo Wegner and Ramond Hanes.

Also at the meeting, the Board approved the following men as trustees of an Institute for Certifying Engineering Technicians: Merritt Williamson, P. E., dean, College of Engineering and Architecture, Pennsylvania State University; Maurice Graney, P. E., dean of engineering, University of Dayton; Oliver S. Hammer, P. E., vice president, United Electronics Labs, Inc.; Joseph M. Parish, P. E., manager, Engineering Department, Engineering and Construction Division, Dow Chemical Corp.; Bernard L. Riggs, senior design draftsman, Phillips Petroleum Co.; Kenneth C. Biegel, Engineering Technician Lab, Minneapolis-Honeywell Regulator Co., Aero Division; and Frederick D. Cummings, manager, Gas Turbine Drafting, General Electric Co. At the time of the meeting one more technician was yet to be named.

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By Mrs. Clark A. Dunn, Chairman, Ladies Auxiliary Advisory Committee.

More and more, wives are accompanying their husbands on business trips and to conventions. They no longer need to stay at home all of the time in order to have a well run house. Engineers have taken care of that with labor

saving devices and time and motion studies. The kitchen has become as technically run as a laboratory. Time which our mothers and grandmothers spent over a hot stove or ironing board can now be used in companionship with children and husbands.

Modern day husbands, yes, engineers even, have found that their wives can help them in their professions. The little woman probably cannot use a slide rule or operate a surveying instrument, but there are many ways in which she can make her influence felt. Her appearance and personality can be an asset or a liability to a man. Most companies now interview the wife of an applicant as well as the job-seeker himself.

The perfect team, therefore, is the engineer and his wife. The husband can supply the "know how" by virtue of his scientific bent and training. The wife, by virtue of her natural sociability, can arouse interest in the engineering profession and in her husband in particular. Through the public relations medium, she can feel a part of her husband's professional life. Both husband and wife benefit when there is a mutual interest, particularly when it is as important as a man's chosen life's work.

Professional engineers have as a potential, a wonderful public relations force which simply awaits their call. This group is their wives working through an auxiliary. As auxiliary members, engineers' wives establish friendly relations within their own group. They learn something about the accomplishments, goals and high standards of the professional engineer. Each auxiliary member becomes well informed on the importance of the engineer to society, so she can make a contribution to the profession on her own.—**End.**

BERGEN

(Continued from page 30)

caveman with regard to housing his family nor with regard to advancing his profession through the communication known as publicity.

Let's be specific. Mr. Zilch must write that technical paper for the engineering society having interest in his project if he is to contribute "to the work of engineering societies . . . ." He must take the time to talk with the trade magazine editor who wants to do a story on his project if he is to contribute to ". . . [the] engineering press." He must speak at his local Rotary or Lions club if he is ". . . to extend public knowledge of engineering. . . ." He must talk to his local newspaper editor if he is to ". . . take care that credit for engineering work is given to those to whom credit is properly due."

He must appear on local television to generate support for future projects which his professional judgment tells him will make highway travel safer. He must speak on radio if young men are to be encouraged to enter the engineering profession. He must speak in public and private to give assurance that his profession has been entrusted wisely with public confidence and money.

This is publicity. This is "letting people know about good work." This is multiplying the capability of word-of-mouth by the effects of print and electronic communication. This is professional publicity worthy of and incumbent upon truly professional engineers.

And, let's face up to the fact that this publicity will do the engineer some personal good, too. A most interesting commentary appeared in the October, 1958, issue of *The Michigan Professional Engineer*. Under the heading *Notes from the Ethics and Practices Committee*, we find this: "Advertising by engineers and engineering firms is an important factor in creating and maintaining a business. Advertising media include magazines, newspapers, billboards, letters, cards, give-away articles and word-of-mouth . . . It appears to the Committee that the use of published articles about engineering accomplishments in a brochure to illustrate the capability of an engineer is not unethical. Any engineer must point to accomplishments as one factor to give a prospective client a basis on which to judge ability; such cannot be considered self-laudatory or competitive bidding when used for this purpose." So even paid advertising can be ethical as a form of publicity.

WE find, today, that dozens of technical societies are crying for technical papers that will advance knowledge of their art. Hundreds of trade magazines are looking for articles that report genuinely newsworthy achievement. Thousands of luncheon club platforms are begging for speakers who will enlighten the lay public. Local and National television and radio, particularly local stations, are desperate for inspired public service programming. Hundreds of thousands of young men are looking for guidance in choosing careers. Millions of citizens, including elected corporate and public officials, are searching for facts on which to base their allocations of private and public moneys that will be spent by engineers.

These publics are being bombarded by many voices. A National Pickle Week has been established to publicize pickles. The Duodecimal Society of America was formed to educate the public and conduct research on the application of 12-base to numeration science and mathematics. The *Macaroni Journal* is being published to serve the special communications needs of an industry. We *could* give the titles of some 3500 trade magazines listed in "Bacon's Publicity Checker," a standard reference work for publicists. We could name the 6000 National and state conventions compiled in the "Trade Directory of Conventions and Trade Shows" published by *Sales Meetings* magazine. The number of individuals and corporations who pay for publicity programs is beyond count.

I cite these statistics only to fashion a double edge sword. The techniques and channels for publicity are numerous and competitive and growing fast, perhaps indicating that we engineers have no chance to be heard. The other edge is the one I prefer to use. This is the edge of opportunity.

We have the opportunity to communicate the facts about our profession through many modern channels using many techniques rather than limiting our communication to word-of-mouth publicity. To its great credit, NSPE is vigorous in our behalf.

Yet, I feel that far too many en-

gineers are doing good work but are keeping it a secret. The Canons establish without doubt the compatibility between ethics, engineers, and professional publicity. To the extent to which we remain silent in the presence of opportunity, we not only ignore this compatibility, we default on our professional obligations.—**End.**

NUCLEAR

(Continued from page 22)

What is a likely area for this office to work with? They will be working across the board, of course, but one area of long-standing AEC policy is particularly interesting. Tremmel phrases it thus: "It is Commission policy to contract with private architect-engineering and nuclear firms for the performance of conceptual and detailed design of both nuclear and nonnuclear portions of its plants unless the nature of the work and the circumstances clearly dictate otherwise."

For the future, it appears that the engineer is going to be more and more in demand for nuclear engineering work. By the end of 1961, this Nation will have ten completed atomic power plants in operation. More than 10,000 licenses for the peacetime uses of atomic energy have been issued by the AEC and are in effect in the Nation today. A number of states are working in conjunction with AEC to bring nuclear power within their boundaries.

New York, for instance has been active in this area, and has made real progress towards the establishing of a waste disposal and possibly a fuel reprocessing cite in the state. Radioisotopes—an offshoot of the nuclear industry—are finding wider and wider use throughout industry. Radioisotopes, for instance, are used for measuring the amount of tobacco in cigarets, and the proper liquid level in beer cans.

The NS *Savannah,* the nuclear powered merchant ship, is expected to begin its sea trials this year. The Navy has close to thirty nuclear powered ships—surface and submarine—currently in commission. Atomic power has started its first job in space. The list could become endless, but what the list indicates is that atomic power is no longer a gleam in somebody's eye. It has come away from the laboratories, and down to the engineer's drawing board. Like any other brand new engineering problem, there are going to be frustrations, disappointments and many headaches before all of the wrinkles are ironed out.

Dr. T. Keith Glennan, president of Case Institute of Technology and former head of the National Aeronautics and Space Administration, recently had this to say about industry participating in nuclear development and engineering:

"Let there be no mistake about it. Industry will get only those things that it can prove it really wants, it really can handle, and it really should have in the public interest . . . Industry must get into this atomic energy business with its own money and at its own risk. To do so it must be willing to take some real chances, and it must knock persistently on the Government's door with ideas, suggestions, and concrete, well-thought-out proposals."

Certainly the gauntlet has been thrown down. With the plain need for engineers in this field of technology, and the avowed policy of AEC to use outside engineers whenever it can, it will be strange indeed if engineers are not among the loudest and most persistent door-knockers at AEC.—**End.**

MISSISSIPPI

(Continued from page 36)

agated; the modifications introduced by tributaries; the succession of river stages; the drainage of its basin and that of its tributaries; the proportion of drainage to downfall, and the discharge of outlets: In fact, every river phenomenon has been experimentally investigated and elucidated. . . ."

As is often the case with an initial effort of this kind, the work done by Humphreys and Abbot has been subjected to considerable refinement. The formulas which they developed in their extensive study of the Mississippi are no longer in general use, but more important, these two engineers served to open the door to further and more refined studies of similar nature. If their formulas are no longer in use, it is certainly true that their formulas are direct forebears of present techniques. The Humphreys and Abbot report and the work behind it represented a pioneering effort, a trailbreaker that went far beyond the scope of sophistication of anything existing at the time in the field of river hydraulics. Certainly flood control measures taken for granted on the Mississippi today can be traced directly to the work of these two engineers.

As their report was completed, Humphreys, Abbot and the entire Nation were engulfed in the Civil War, which, with other factors, postponed immediate and extensive work toward the taming of the Mississippi. However, there has not been a major flood disaster on the Mississippi since 1927. The river is contained on its west bank with levees that run from Cape Girardeau to the Gulf of Mexico; on the east bank, levees run from Hickman, Ky., to Bohemia, La., with the exception of sections where high bluffs close to the river make levees unnecessary.

Cutoffs, revetments, overbank floodways, outlets, dikes, pumping plants, floodwalls and many other methods of flood control go to make up the entire system. From a dollar standpoint, a program of further improvements on the Mississippi to the amount of $1.7 billion had been authorized as of July 1960. If this seems expensive, consider that since 1928, over $6-billion in damages have been prevented.—**End.**

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SPECIAL REPORT

(Continued from page 45)

George Hawkins, "Since the announcement we have experienced very little difficulty in putting the plan in practice, although in some instances it has been necessary to give a complete explanation to our prospective customers. When we have had an opportunity to give this explanation it has invariably been accepted once it has 'been understood."

While such a program clearly can't be applied in all cases by all people under all conditions, it has, in this case, worked. It would also certainly seem to provide an apt subject for consideration for the many other businesses in the Nation which are faced with the harassing problem of so-called "free" engineering.—**End.**

BUEHLER

(Continued from page 44)

of income in a wide variety of fields: Public administration, education, health, transportation, power, agriculture, industry, urban development, etc. Characteristics of such projects are:

- They provide services which facilitate, or are in some sense basic to, the carrying on of a great variety of economic activities.
- The services are, in practically all countries, supplied by public agencies or by private agencies subject to some public control.
- The services cannot be imported.

It is readily perceivable that power projects fulfill each of these characteristics. Obviously little industrialization can occur without a power source—whether it be self-contained, or of a utility nature. In addition, power represents an economic development whose benefits are felt very quickly by the population.

There is another advantage, too, which is receiving increased attention from many planning experts. Power represents an industry of a sufficiently complicated nature to condition its workers—and indirectly the people—to a mechanical age.

One of the most difficult things to get across to a worker in a newly developing country is the idea of maintenance.

Somehow or other, his thinking runs along the lines of "this marvelous machine that runs by itself is unlike my donkey who brays when he needs to be fed . . . or balks when the load is too heavy . . . or picks the easiest path among the stones." So the machine runs and runs and runs, until one day it breaks down because it hasn't been oiled. The worker shrugs his shoulders and says "I told you all along this 'progress' was no good" —and goes back to his donkey.

The training necessary both in building a power plant and its subsequent operation conditions

About the Author . . .

Mr. Buehler

John P. Buehler is manager of hydroelectric power for Bechtel Corporation, engineers and constructors of San Francisco, Calif., and as such supervises engineering and manages major construction of hydroelectric and other water use and conservation developments undertaken by his company. A graduate of the U.S. Military Academy, he also holds a master's degree in civil engineering from MIT. Buehler joined Bechtel in 1955 following his retirement from the Army Corps of Engineers with the rank of colonel. He is a Fellow of the ASCE and a member of the U.S. Committee of Large Dams.

the thinking of the individual worker and his friends to the very important concept of maintenance. This in turn readies them for further advances along the road to industrialization.

Since economics control virtually all decisions affecting engineering and construction, the engineer-constructor has become more deeply concerned with the broad economic aspects of potential projects —particularly in overseas work. While remaining primarily a technical facility, the large engineer-constructor now conducts comprehensive preliminary studies that are economic as well as technical. He has learned to make use of the tools of the trade—especially the services of outside agencies such as the various research institutions.

On major projects overseas, the planning period can be extensive before any actual engineering and design commences. Answers must be found to such questions as: Can this installation be supported by the economy of the country? What are the present markets and potential markets for the services? What conditions are considered best for financing the work? What is the political climate and how can it affect the original investment and future operations?

Particularly in the newly developing countries the problem of financing is a major one. In most instances these countries must turn to foreign investors for help. Many times they have had no experience in obtaining loans from various American lending agencies. In these instances the U. S. engineer-constructor familiar with overseas work can be of value in pointing out what needs to be done. They can also set up and perform the engineering studies and help prepare the documents for submission to the lending agencies.

The engineer-constructor with this type of economic background, accustomed to thinking in terms of the economic aspects of an overseas project, is in a much better position to make a success of such projects. This is an area, of course, where diplomacy, tact and understanding are necessary to extract from policies and practices which may be entirely different from those of the United States the basis for

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BER

(Continued from page 40)

petitive bidding because the client (city) was then in a position to select the firm on the sole or primary basis of the lowest net fee. The engineering firms were in a sound position in declining to be placed in the position.

Although neither the Canons nor Rules seem to cover specifically the question of a joint agreement on the fee reduction, we believe that it was not prudent for the firms to determine a set figure to be used by all in offering the city a credit. This smacks of collusion and thereby may tend to raise suspicion and doubts in the mind of the public as to whether there is a "conspiracy" to serve the interests of the engineering firms over the taxpayers. We further believe that it would have been better procedure for all concerned for the engineering firms to jointly agree among themselves and notify the city officials that they could not engage in a procedure which amounted to competitive bidding and request that the city make a selection of the firm deemed most suited for the work, following which that firm would independently negotiate with the city on an appropriate reduction of the fee.

Conclusion:

Q. 1.—The offer of a definite reduction in fee by each of the several firms would have consti-

tuted competitive bidding and the firms were correct in refusing this requested course of action.

Q. 2. —While the Canons of Ethics and Rules of Professional Conduct do not specifically cover a joint agreement among several firms on a reduction of fee, public confidence and understanding of the professional nature of engineering services will be enhanced by adherence to the more desirable position of having the client select one engineering firm for further negotiation on a fee credit for services and data furnished by the client. Extra care should be taken to avoid any implication of collusion among engineering firms in establishing fees, but recommended state society schedules of minimum fees may be followed in establishing the fee. The engineers, by conferring and agreeing on an amount of reduction in the fee, acted unethically under Section 19 by exposing the engineering profession to public criticism and misunderstanding.

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GAMMELL

(Continued from page 39)

activities in our own company.

Another area where some work needs to be done and can be done in part by industry is in the field of professional ethics. The writer recently had occasion to give a talk on professional ethics and was very much pleased to find a tremendous amount of interest in a discussion of such commonplace matters as the faith of an engineer, "Canons of Ethics" as prepared by ECPD, and the engineer's pledge as listed by the National Society of Professional Engineers. The desire to be an ethical person and do the right thing is deeper and more basically a part of us than perhaps we real-

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ize. Everyone, I am sure, reacts to such a powerful phrase as might be indicated by the prophet, Amos, "Let judgment run down as waters, and righteousness as a mighty stream." While our engineeering ethics are not yet firmly established, we need to get about the establishment of them as quickly as we can. No group can operate at their maximum efficiency if they are, as previously stated, continually harassed by problems which could have been avoided by the practice of a sound body of ethics.

As a conclusion, it would seem to be most worthwhile if someone in every industrial community concerned with the training of young engineers were to take it upon himself to get those of like minded interest together to discuss how each of them perform this task and how they might do it better. They could use as a guide the considerable ECPD literature which has already been widely distributed. They would find excellent assistance possible in the various professional societies, particularly NSPE which has chapters everywhere, has an interest in professional development and also much literature on the subject. Such a meeting could include the deans or prominent professors of the local engineering colleges; selected chief engineers; training or industrial relations people or whoever happen to be responsible for the industrial training of the young engineers for effective employment in the particular plants operated by their company.—**End.**

About the Author . . .

Mr. Gammell

John Gammell, P.E., director of professional development, Industries Group, Allis-Chalmers Manufacturing Company, received his bachelor of science and electrical engineering degrees at the University of Washington, Seattle, in 1928. With the exception of three years during World War II, he has remained with Allis-Chalmers since that time. Prior to his present position, Gammell served as a sales engineer, sales train-

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ing supervisor, and graduate training director. He now develops and administers a professional growth program for engineering personnel. A registered professional engineer, he is a member of ASME, ASEE, AIEE, president of the Wisconsin SPE, and chairman of the Engineers' Council for Professional Development Committee for the Development of Young Engineers.

JESSI

(Continued from page 33)

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students has been taken by the Western Air Conditioning Industries Association in conjunction with the Engineering Division of California State Polytechnic College at San Luis Obispo. Of some 320 applicants—again a measure of enthusiasm on the part of students—some 40 high school students were chosen to take part in this program. Confined to two days on the campus, the students who attended were given ample opportunity for finding out about both academic and industrial aspects of an engineering career.

At the end of the program, Dean of Engineering Harold P. Hayes had the following pertinent comments to make: "The success of this program will be measured in the number of preview participants who enter college engineering programs. Several students indicated that formerly they had not intended to enter engineering, but as a result of the program they are convinced that an engineering career is what they desire."

With today's tendency to over glamorize the scientist, and with the continuing need for skilled and highly motivated engineers, these programs would seem to take on additional meaning. The high school student simply is not exposed to this profession in his normal studies. When he enters college, he is likely to spend a good part of his time on general courses rather than engineering for the first year or two. Thus, it would seem most logical to let the talented young student know what is available to him in an engineering career, and what standards he will have to meet to have such a career open to him.

It is blatantly clear that the high school students want to know these things. The unbridled enthusiasm with which these programs are greeted, and the high praise which they receive when they have been completed are ample proof of this.

The only remaining question would seem to be deciding upon the best and most effective way of making these experiences available to the young engineer prospect. That the engineering profession has a responsibility is clear. But just how the responsibility should be met, and how active a part the engineering profession can take, are still undecided questions. Until these decisions are made, it is safe to say that the various efforts from many sources to meet the need for better high school orientation will not achieve their full potential.—**End.**

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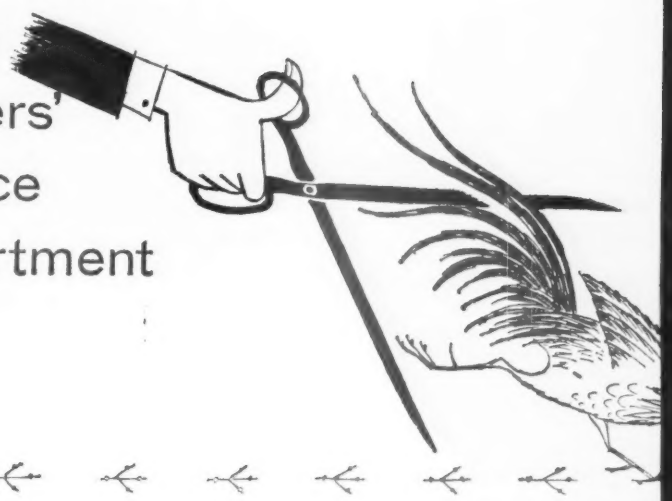

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August, 1961

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Progress in Products

MICROFILM READER — Item 30

Recordak Corporation has announced the Recordak STARLET, the first low cost motorized film reader developed for viewing microfilm images. The Recordak Starlet accepts 16mm microfilm contained in Recordak film magazines, or, with a simple adapter, can also accept microfilm spooled on conventional reels. The Starlet is available in two models to meet the electrical requirements of office or mobile installations (i.e., bookmobiles).

POCKET DAY-TIMER — Item 31

Designed especially for people whose work takes them away from their desks, the new wallet-style pocket Day-Timer unit is available from Day-Timers, Inc. The pocket unit provides a virtually automatic system of memo making and eliminates loose notes which can be misplaced or forgotten. It can be used away from the office with the compact desk Day-Timer designed for office use, with entries to provide reminders of upcoming deadlines, accurate records for billing expense accounts and tax purposes.

LIGHT FIXTURE — Item 32

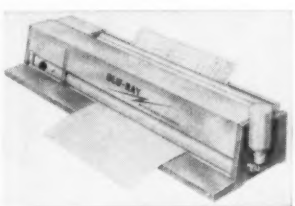
More seeing comfort heads the list of advantages claimed for the Duplex-a-lite, a fluorescent lighting fixture of new, twin-lens design announced by The Miller Company. The new fixture features twin lamp chambers and optically designed prismatic lenses that direct and distribute most of the light downward to the work plane and away from the critical 45°-90° viewing zone. This assures a maximum of useful light and optimum seeing comfort. The ceiling and the center channel cover are softly illuminated. Cooler operation of lamps and ballast is claimed because of the wide separation of Duplex-a-lite's lamps in individual compartments leaving an exposed, heat-dissipating metal channel cover.

INTERRUPTER SWITCH — Item 33

A new high voltage load interrupter switch for metal-clad switchgear in industrial and commercial buildings has been introduced by S&C Electric Company. The new three-pole load interrupter switches up to 1200 amps, closes on 60,000 amps when fused, and costs as much as $200 less than former models that could carry 1200 amps but interrupt only 600 amps. The new load interrupter switch meets all latest National Electric Code requirements for fault closing and has been completely tested at full rating by KEMA Laboratories. The new switches are more compact than prior 1200 amp models, use parallel pairs of blades, have dual contacts, and include integral quick make, quick break mechanisms.

DRY DEVELOPER — Item 34

A low cost continuous action developing machine for developing Diazo papers and materials is now available. The Blu-ray Diazo Developer, a portable rotary type dry developer, will develop prints up to 42" in width of any length, at variable speeds of from 1" to 72" per minute. It provides faster print developing production than the conventional stack or tube type developers.



DRAWING TABLE-DESK — Item 35

This versatile and ultra-modern combination from the STACOR "Coordinate Group" provides a complete working unit with maximum convenience and efficiency for the draftsman. The "floating board" drafting table has the STACOR exclusive Toe-Touch Pedals that give complete control from a seated position of every board height from 30" to 45" and any angle from 0° to 90°.

MINIATURE RECORDER — Item 36

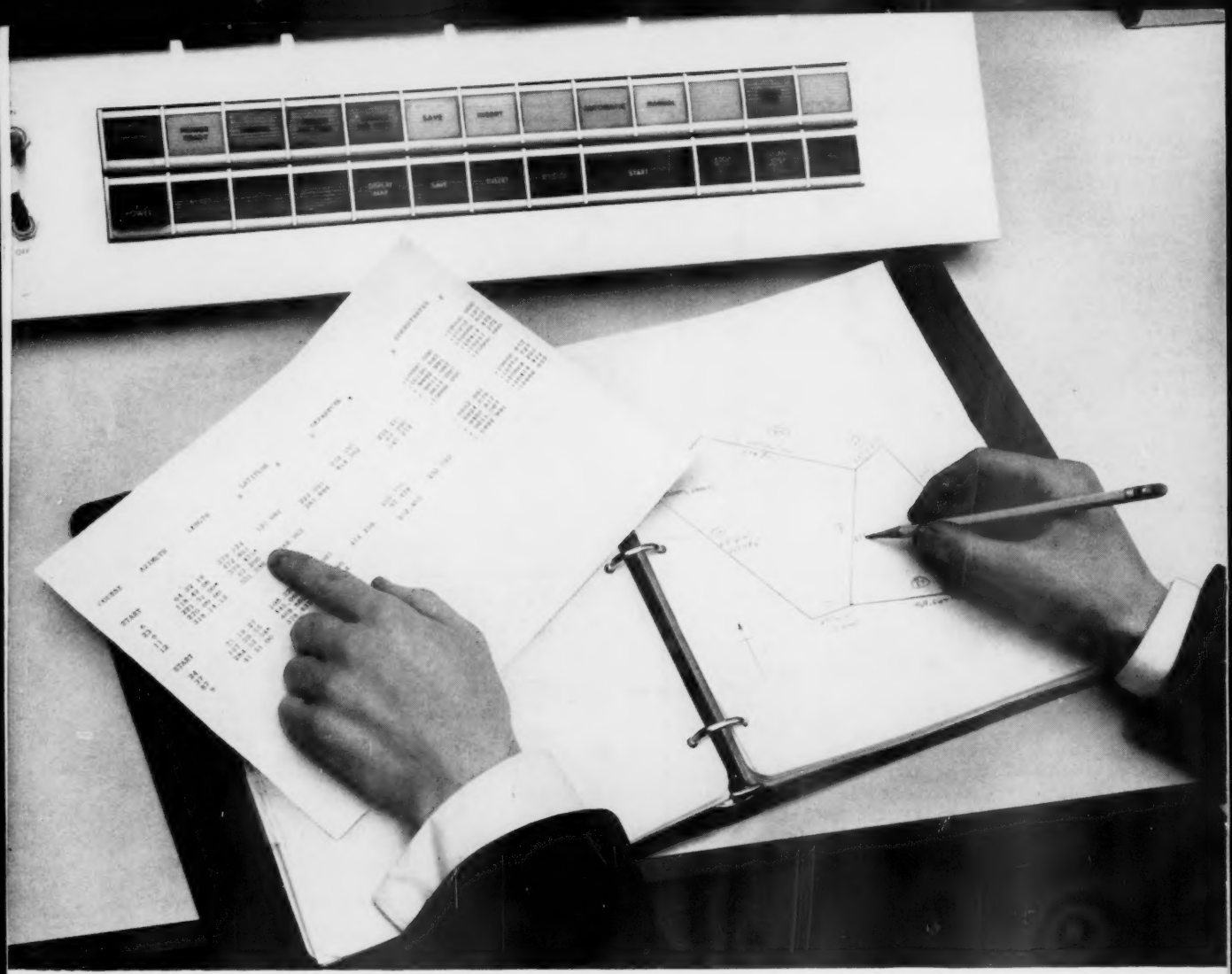
A new miniature circular chart recorder as small as a conventional meter and capable of recording any variable that can be converted to an electrical signal was announced recently by the Instrument Division of Thomas A. Edison Industries. Only 3¾" x 3¾" deep, the recorder requires no pen, ink or ribbon, the graph being printed by means of a stylus on pressure sensitive paper. A simple gear shift mechanism in the form of a built in three position sliding lever provides a three-speed adjustment of the chart rotation. The 3" diameter chart is remarkably legible.

INSERT KIT — Item 37

A kit of Tap-Lok self-tapping inserts for use in experimental and prototype work has been introduced by Groove Pin Corporation. The new kit includes a representative selection of various types and sizes of standard Tap-Lok inserts as well as seven different installation tools. With this material, the user can select, insert and test Tap-Lok installations in woods, plastics or soft metals. The inside cover of the specially-designed package contains illustrated installation instructions and a chart showing recommended drill sizes for using Tap-Lok inserts, sized from no. 4 up to 5/16", in various materials.

This feature describes new products of general interest to professional engineers. For further information, circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

These listings are informational and are not an endorsement of the products, nor of the manufacturer's claims.



A time-saving package for the subdivision engineer... the IBM 1620 traverse closure and curve data program

It calculates a seven-sided traverse in less than *one minute* from the time you put the paper tape in until the typewriter prints out the solution. Users of the 1620 Data Processing System can have this new program free-of-charge.

The program actually consists of two programs—*traverse closure program* and a *lot and general curve data program* incorporating the same subroutines. The traverse program will accommodate thirty-sided traverses. It will automatically select the proper method of computing the missing bearing(s) and distance(s) from among the five possible end solutions. For each course it prints out the course number, bearing, distance, end coordinates, and the traverse area in square feet and acres.

The program is flexible—you may use typewriter or paper tape input—you can decide whether the program is to report bearing and angles in tenths of seconds or seconds.

And, you'll find that the 1620 is easy to use, fast and powerful. It's the most outstanding engineering and scientific computer in its price range. A basic installation rents for just $1600 a month.

To learn how the 1620 can free you for more creative engineering work, call your local IBM Representative.

IBM's 1620 is a compact desk-size computer.

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